ENGINEERING

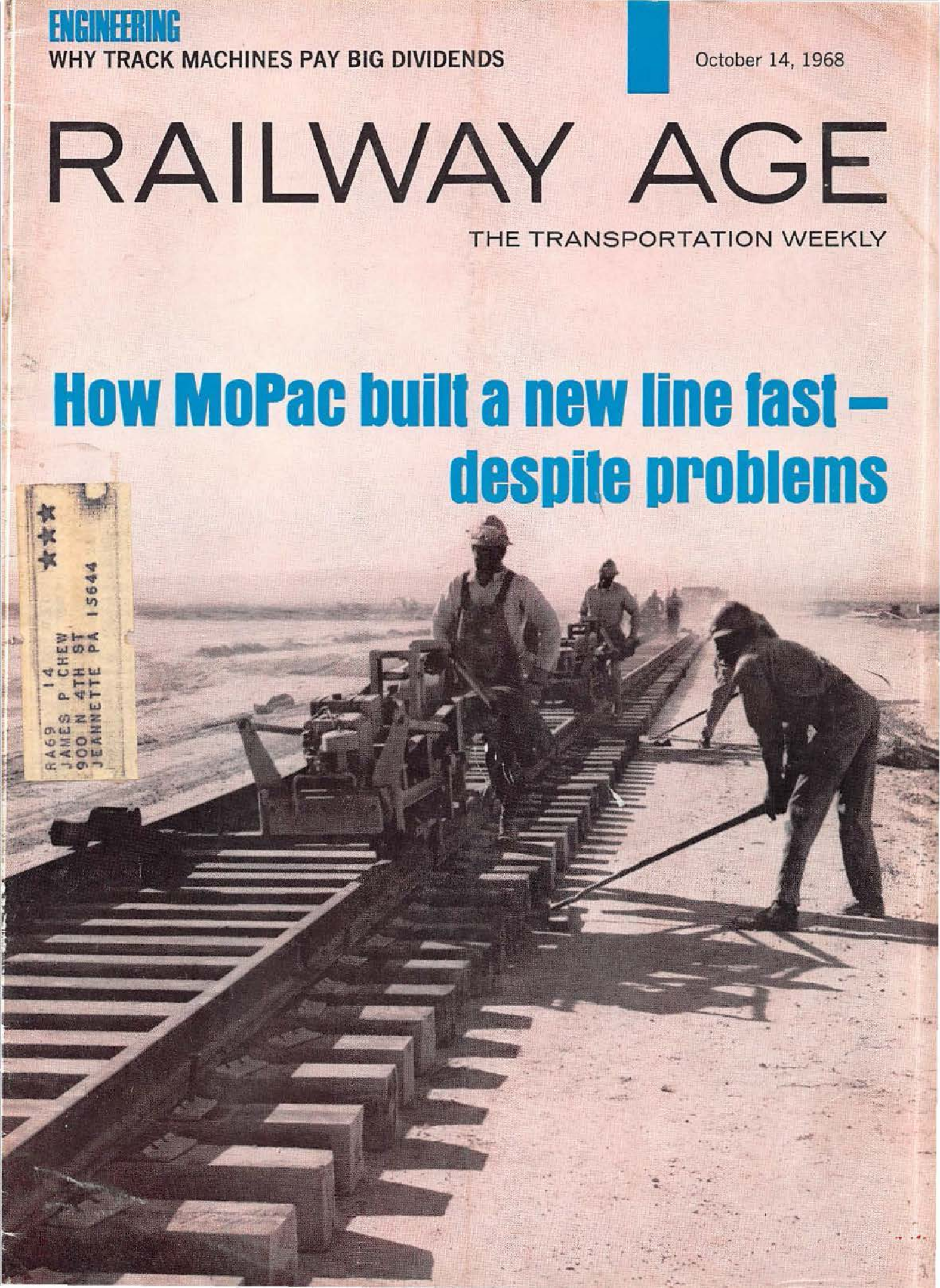
WHY TRACK MACHINES PAY BIG DIVIDENDS

October 14, 1968

RAILWAY AGE

THE TRANSPORTATION WEEKLY

How MoPac built a new line fast — despite problems



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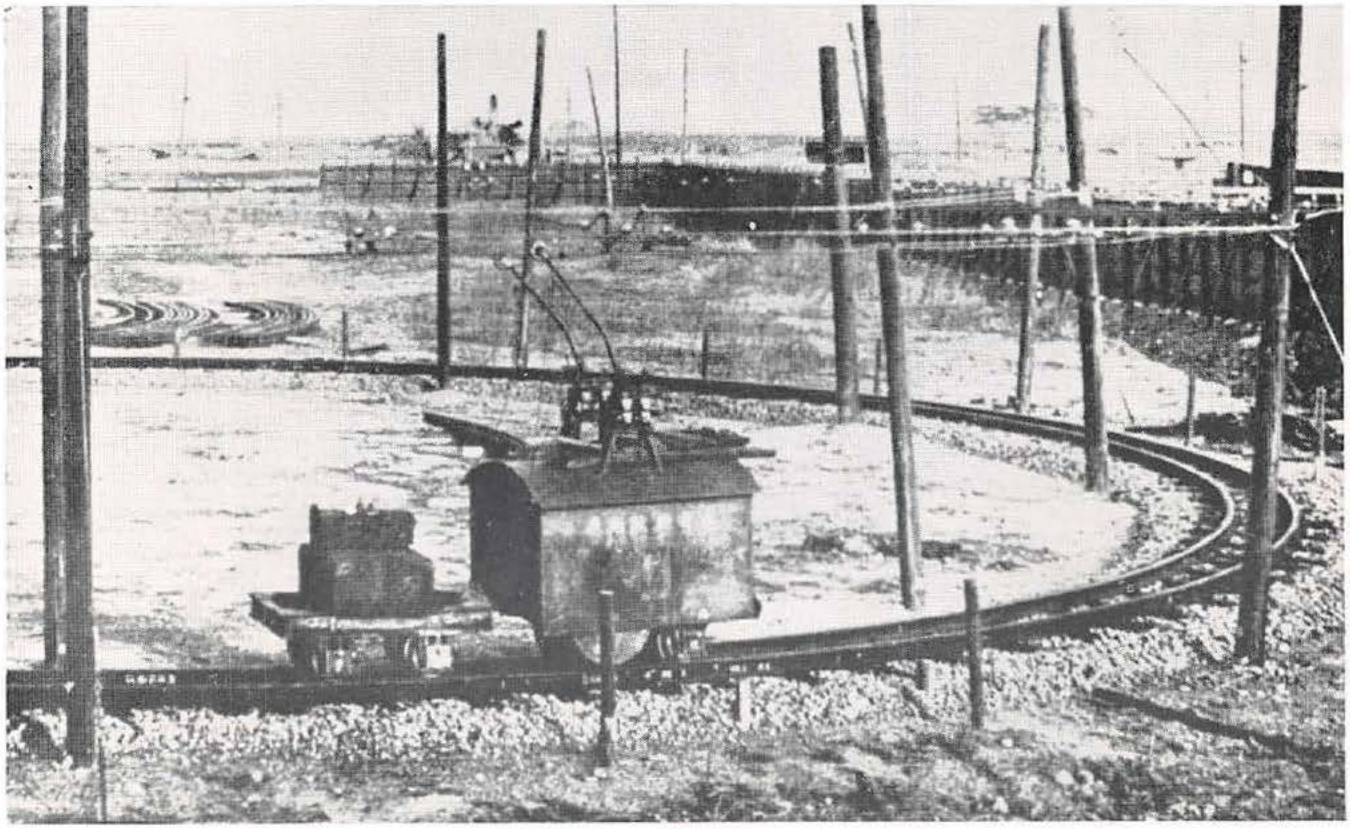

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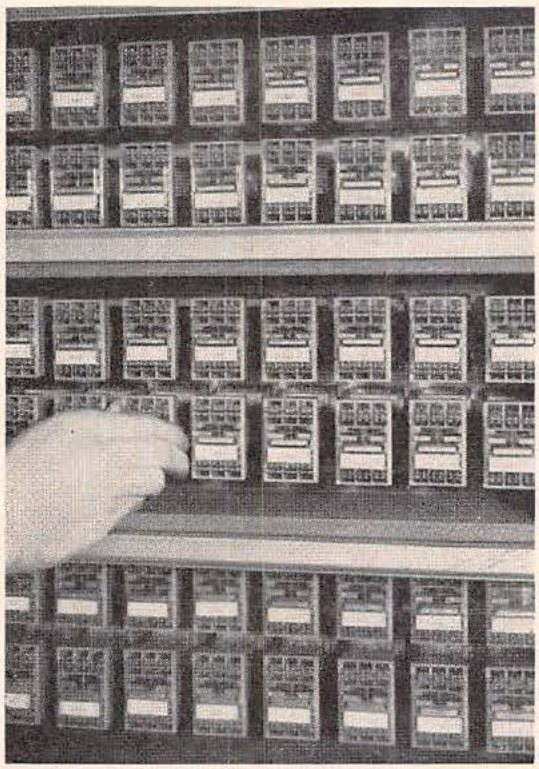

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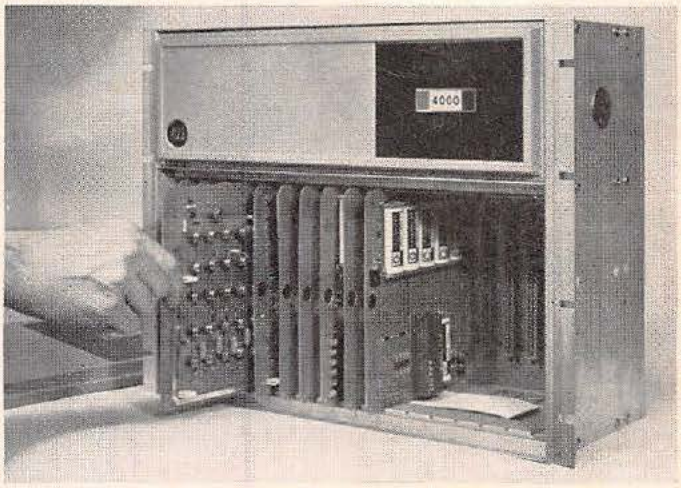

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RAILWAY AGE

Oct. 14, 1968 • Vol. 165, No. 15

THIS WEEK

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Some answers were given at the C&S Section Dallas meeting.

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Management-labor cooperation is a firm foundation for success.

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. . . AND COMING NEXT WEEK

The use of radio to control mid-train locomotive units is increasing rapidly. The Louisville & Nashville, for example, is doing just that with the 300-car, 26,000-ton coal trains it operates regularly over one of its Kentucky routes. Next week's story will tell how the road solved the problems of slack control and the starting of the trains.

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Editorial and Executive Offices
Chicago, Ill. 60604, 14 E. Jackson Blvd.

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Engineering:
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Editorial Assistant: Wanda Brown

Washington, D.C. 20004,
National Press Bldg.
Washington Editor: Walter J. Taft

London, W.C. 2, England, 4, Talbot House; 98 St. Martin's Lane
International Editors:
Geoffrey Wilson John Levett

Contributing Editors:
Norman E. Gillespie
3205 Chelsea
Orlando, Florida 32803

Charles Layng
115 West Gore St.
Orlando, Florida 32806

E. L. Woodward
876 Chattanooga Ave.
Pacific Palisades, Calif. 90272

GEORGE DUSENBURY: Editorial Director

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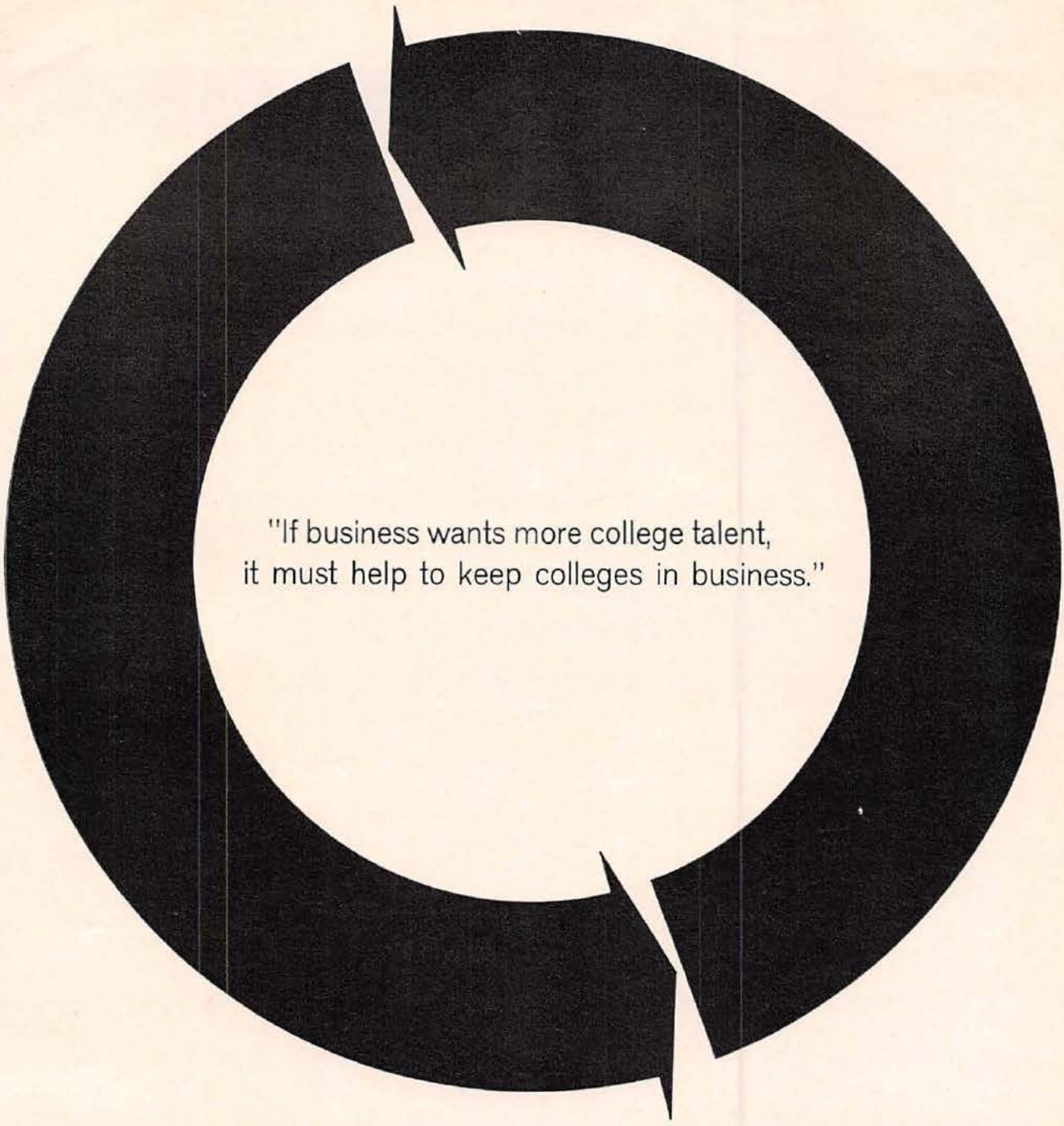

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SHORT AND SIGNIFICANT

Exchange offer on Santa Fe Industries expires

Santa Fe Industries' exchange offer to shareholders of Santa Fe Railway expired Oct. 4, and it won't be extended. As of Oct. 2, SFI had received deposits of more than 96% of the shares of the railway company.

Rock Island centralizes its stations

Beginning Oct. 14, Rock Island passenger trains serving the Quad Cities of Illinois/Iowa—Rock Island, Moline, Davenport and Bettendorf—will operate out of a newly-refurbished station at Rock Island. Stations at Moline and Davenport will be closed on the same day. Rock Island outlined its centralization plan months ago, in talks with civic leaders of the various communities. Later, the Illinois and Iowa regulatory commissions put their approval on the proposal. Modernization of the Rock Island station included interior and exterior decorating, installation of air conditioning and improvement of parking facilities.

Profits rising? Yes and no, report C&O/B&O

In this year's first nine months, Chesapeake & Ohio/Baltimore & Ohio had net income of $36.2 million. This was much better than the $34.8 million reported in the corresponding period of 1967, but not so good when compared with the $44.3 million earned in 1966. C&O/B&O prefer the latter for comparison purposes. In 1967, they point out, strikes ate into normal traffic levels—and in 1968 the threat of a steel strike gave an artificial boost to business early in the year. Their conclusion: However good they look on the surface, 1968 profits are "not a sign of generally strengthened earnings."

Editors to quiz chief executives at RPI meeting

What's ahead for the railroad industry? Four leading transportation editors will try to find out as they question four railroad chief executives in Washington Oct. 24. The occasion will be the annual Rail Executives Panel of the Railway Progress Institute, which leads off (at 10:30 a.m.) a day that will also feature the annual RPI members' luncheon (noon) and the annual dinner at which RPI will present Golden and Silver Freight Cars for effective freight-traffic promotion. On the Rail Executives Panel will be Chairman Frank E. Barnett of the Union Pacific, President W. Graham Claytor, Jr. of the Southern, President William B. Johnson of the Illinois Central and Chairman Stuart T. Saunders of Penn Central. The questions will come from representatives of the New York Times, Forbes, Business Week, and the Wall Street Journal. TV panelist Lawrence E. Spivak will be moderator. ICC Chairman Paul J. Tierney will address the members' luncheon.

North American, Ryder System begin talks

Two major entries in the leasing business—North American Car in railroading, Ryder System in motor carriage—are talking about what's referred to as a "possible association." At this point, pending further evaluations, no specific proposals have been made. Ryder has been involved in a multi-phase expansion program this year; North American has been reported talking in the past with other potential partners.

Katy salesmen get together —all of them

Katy's 120 freight salesmen know their railroad — and each other—a lot better than they did a couple of weeks ago. From 40 offices across the country, they came—for tours and meetings that stretched over six days. A special train took the group on freight-only Katy from Kansas City to San Antonio for a staff meeting conducted by Frank J. Heiling, vice president-sales and service, and attended by Katy President John W. Barriger. Tour stops were made at Parsons, Kan.; Dallas; Waco; and Pryor, Okla. One objective: "To let Katy people become acquainted with the vast industrial potential of Katy territory."

MONDAY MORNING REPORT

PROGRESS CALLS FOR CHANGE

The time has come for rail labor and management to huddle and draft new plays for the old team. If they don't get together, they'll sink together, because the competition has grown too strong to meet divided. So says James H. MacAnanny of the Federal Railroad Administration.

TAILOR THE PRODUCT TO SHIPPERS' NEEDS

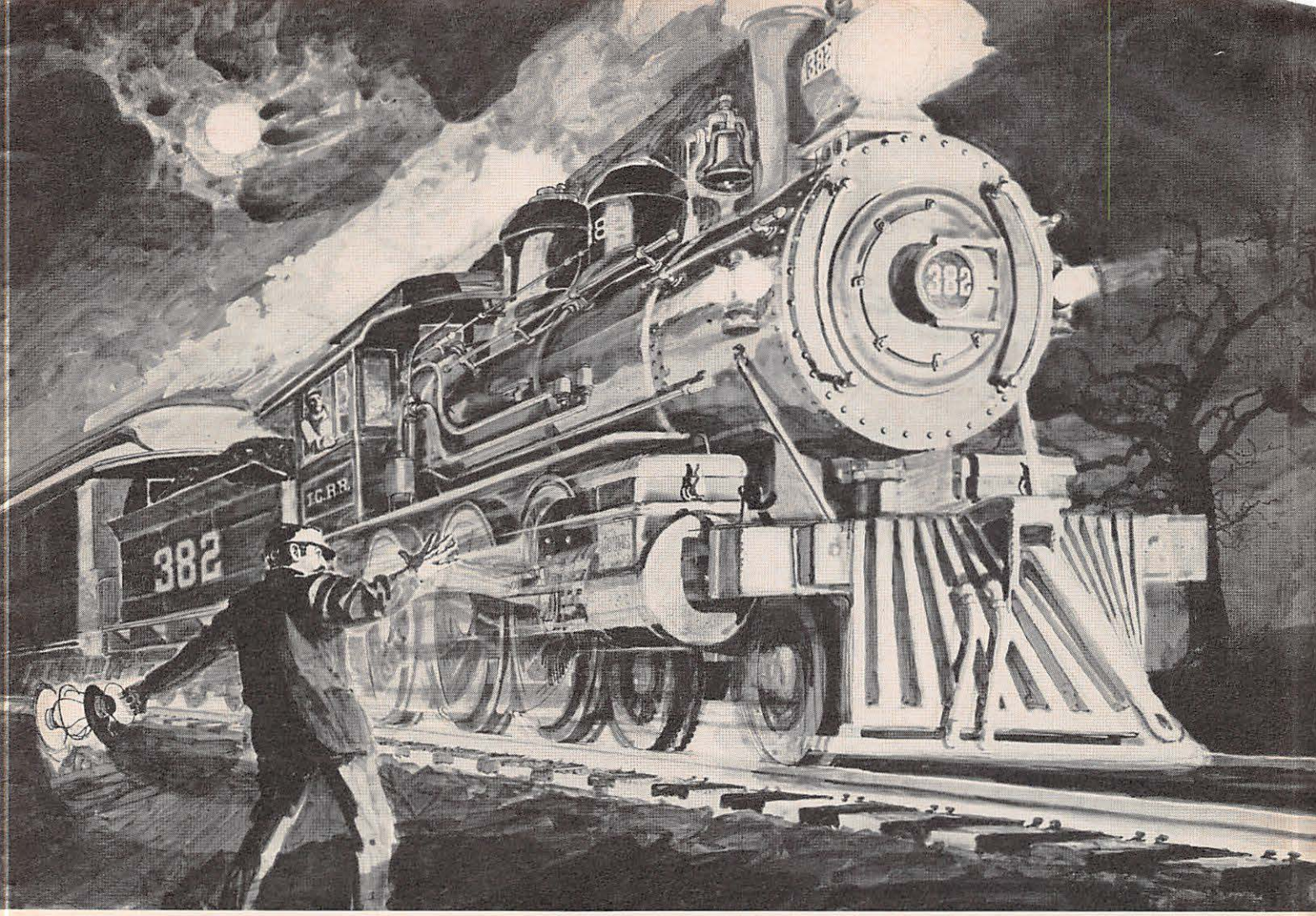
Too long have rail men been glued to practices that hold them from meeting shippers' needs competitively, MacAnanny says. "Together you design and tailor your transportation product to existing work rules and not to those shipper ground rules which could truly make you a growth industry—which could again attract fresh capital to the industry and in turn could swell your employment ranks. In short, both management and labor leaders have allowed agreements founded in monopolistic days to exist too long, and to slowly bring the industry up to the cliff of disaster. The present plight of the industry, in my judgment, is self-inflicted, and—contrary to popular belief—appears to be more serious than all government programs lumped together."

FOUR MAJOR GOALS FOR RAILROADS

The objectives of the proposed program would be these: Investigate the relationship between rail operating procedures and employee work rules and its impact on the quality of service; develop a data base and analyze techniques for changing rail operating practices and work rules; develop, test and help implement new operating procedures that will use available rail resources more effectively; develop, test and help implement new work rules that will protect and improve the status of operating employees.

THE FOCUS MUST BE ON THE FUTURE

The alternative to this project is a continued drift toward government ownership, MacAnanny warns. The public already takes that for granted because all it has to judge by are three major rail strikes in the last year alone (with five more pending), wide coverage of the Messer Report, continuing ex parte hearings on freight rate increases and car shortages, and internal merger problems. The bad public image comes from the same source as bad profit figures—"the inability of railroads to produce a truly competitive transportation product . . . demanded by today's expanding transportation market." Management and labor must both focus on the future. They must define the competitive, technological, political and regulatory environment in which railroads have to operate.



Remember her?

During the two brief months that Casey Jones mounted the cab of engine No. 382, the Cannonball Special became a legend in its own time. With Casey at the throttle and 21,922 pounds of traction from her six massive 69-inch drivers, she roared to a reputation as one of the Illinois Central's fastest passenger trains.

On a foggy April morning in 1900 she smashed into the last four cars of a freight in a wreck immortalized by the folk song. After the wreck, which took Casey's life, she was rebuilt and continued her famous career until 1935. Then she chuffed into history with Casey.

There's another kind of history being written today in railroading. It's the economy story of piggyback cars, unitrains, fast, roller bearing freight, and the high-power diesel-electric locomotives that pull them. And Humble is providing railroad people with the modern petroleum products they need.

But we'll never forget the days of steam, because most of our people started then. In the shops.

Above all, we've never forgotten how to give you the kind of service that only a railroad man knows how to give. Your Humble railroad man is a good man to know, whether you want to talk about trains of yesterday, today or tomorrow.

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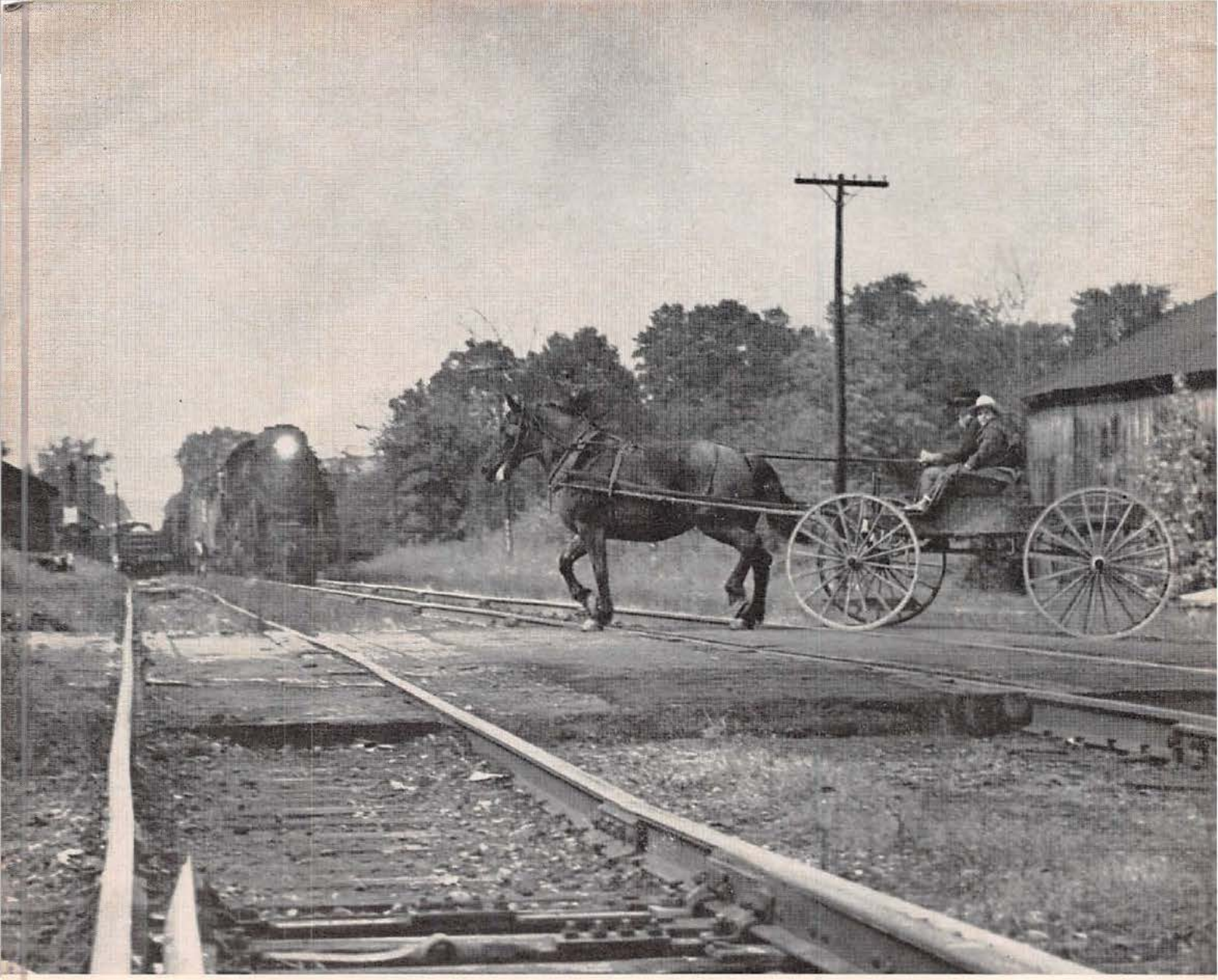


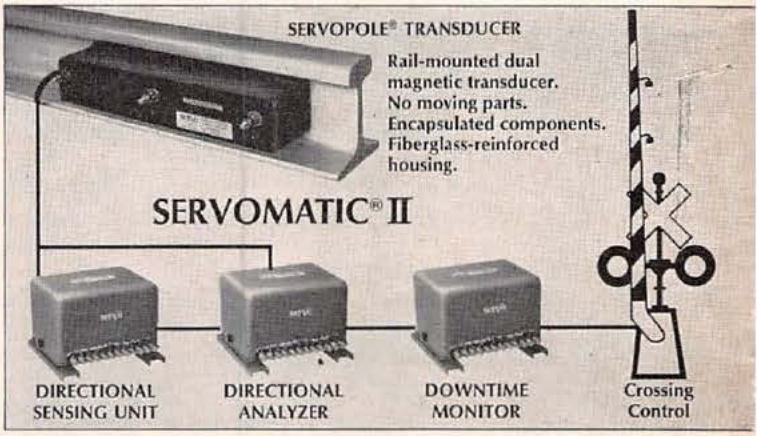
"I been thinkin', Ezra—it's gettin' so hectic 'round these parts—those railway critters oughtta set up one of them newfangled Servomatic crossing control systems!"

OUR horse and buggy friends were thinking a good number of years ahead of their time—but they were on the right track (no pun intended).

Today, things certainly do get "hectic" around railroad crossings, particularly at busy industrial switching areas. And that's exactly the place for our new SERVOMATIC® II Crossing Control System. SERVOMATIC II performs three basic functions: automatically determines train direction; provides required timing; actuates the crossing protection devices (flashers, gates, etc.)—*but only when necessary.* If the train stops short, or moves away from the crossing, protection is automatically timed out—permitting safe access to the crossing by vehicles and pedestrians. Switching operations are safe and more efficient, crossing downtime is minimized, and unnecessary traffic tie-ups are eliminated without the need for manual supervision.

SERVOMATIC II is built for long life with minimum maintenance. A unique "building block" arrangement allows easy, economical expansion of protection coverage for additional tracks in complex crossing areas.

If you're a railway "critter" who wants to know more about this "newfangled" system, just ask for Tech Data Publication 2012.



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RAILWAY AGE
THE TRANSPORTATION WEEKLY
October 14, 1968

WEEK AT A GLANCE

TOFC loadings hit a new high (again)

If 12 more cars had been loaded with piggyback trailers in the week ended Sept. 28, the 29,000-car barrier would have been broken. As it was, the 28,988 cars of TOFC traffic hauled that week still managed to set a new all-time high, surpassing the previous record of 28,937 established just a week earlier. In this year's first nine months, piggyback loadings totaled 995,161 cars, carrying 1,619,574 trailers, compared with 891,508 cars and 1,465,605 trailers in the corresponding period a year ago. If further proof of the continuing health of piggyback is needed, it comes from Trailer Train Co. Last week, the piggyback-car-leasing company placed orders for an additional 487 cars, bringing orders for 1968 so far to 5,052 cars. Delivery of the new order will bring the total Trailer Train fleet to 48,130 cars, according to President James P. Newell.

New automatic coupler stirs interest

One of the nation's major steel companies may be on the threshold of ordering several carsets of the Compatimatic coupler, the new automatic unit which made its first public appearance at the recent annual meetings of the Coordinated Associations in Chicago. The National Castings product, which unlocks automatically and remains fully open and ready for recouple at all times, is reported to be under close study by at least a half dozen railroads, with one possibly on the verge of seeking several carsets for application to existing cars.

NC's Compatimatic, which reached the prototype hardware stage as recently as last March and has since undergone intensive laboratory and field testing, not only can maintain its "ready" condition for coupling under a variety of conditions, but also can come equipped with an associated automatic train-line connector system. This train-line system, which can be rotated out of the way so as not to obsolete present couplers lacking the automatic features, can have automatic air line or automatic electrical connections or both. The automatic electrical connections make possible future installation of electronic train control operated from the locomotive cab.

NC officers feel confident that, while the unit is still undergoing a complete cost analysis, the final figures will indicate that "its cost will definitely not be prohibitive."

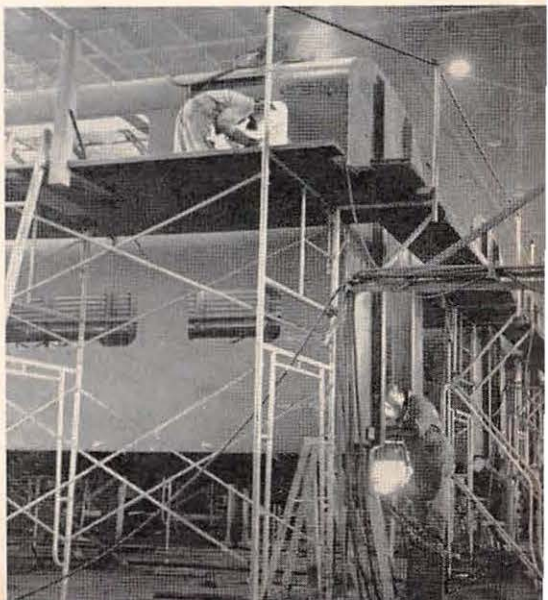
For SP commuters, 15 new bi-levels

Pullman-Standard may never get rich on its commuter-car business — but the commuters appreciate the effort just the same. With Chicago & North Western's latest order wrapped up, P-S is now working on these 15 bi-level coaches for Southern Pacific's San Francisco Peninsula service. The air-conditioned cars, ordered at a total cost of more than $3 million, will be delivered to SP beginning late in October.

A new voice heard in the Belt strike: Mayor Daley's

If clout is what's needed to get the Belt Railway of Chicago strike off dead-center, then there should be a feeling of optimism on the part of those who want action. Chicago Mayor Richard J. Daley, it's indicated, is taking a hand, promising his full cooperation in getting the affair settled. The Belt strike, called by the Brotherhood of Railroad Trainmen in a crew-consist dispute, began July 29. The National Mediation Board has refused to call for creation of an emergency board and, in the absence of that action, nothing has happened. While nothing has happened, according to the Chicago Association of Commerce and Industry, industrial-production losses have run into the hundreds of millions of dollars. One recent estimate: $175 million. Earlier, Chicagoans and other midwesterners deeply concerned with the situation enlisted the support of Sen. Everett McKinley Dirksen, minority leader of the Senate.

It takes nothing away from the senator to point out that where the present Administration is concerned, Mayor Daley yields to no one in the power he wields.



GUS WELTY

LINES ON LABOR

ONLY A FEW HOLDOUTS now stand between the railroad industry and a period of relative peace—so far as wages are concerned. At this point, none of the remaining disputes seems likely to bring on a crisis—though there are few sure-thing bets in the complicated world of management-labor relations.

AMONG THE OPS, only the Brotherhood of Locomotive Engineers and the Order of Railway Conductors & Brakemen have balked at settlement. Among the non-ops, it would appear that the Brotherhood of Railroad Signalmen is destined to make the most fuss. The biggest unions in both groups are safely in the fold—the Brotherhood of Railroad Trainmen and the Brotherhood of Railway and Airline Clerks. So are such organizations as the Brotherhood of Locomotive Firemen & Enginemen, the Brotherhood of Maintenance of Way Employees, the Switchmen's Union of North America, the Transportation-Communication Employees Union, the American Train Dispatchers Association, the Railroad Yardmasters of America and the Hotel and Restaurant Employees and Bartenders International Union. The six shopcraft organizations, who precipitated a strike last year and wound up with Congressionally-imposed arbitration, haven't been involved in the current round of negotiations.

SKILL AND ITS PROPER RECOGNITION is the block over which the carriers and the holdout unions are stumbling. The BLE contends that the engineer "is the most important employee in the industry." The ORC&B can point out that, while the engineer is indeed important, the conductor is the "captain." And the BRS talks grimly of its determination to "remove the wage inequities which have too long prevailed for these skilled employees whose work is essential to safe and efficient movement of trains."

RECENT HISTORY tends to add strength to the hope that these disputes can be resolved without resort to force. Wage cases—as opposed to complex rules cases—have seemed susceptible to settlement through the ordinary processes of the Railway Labor Act, with the 1967 shopcraft dispute standing out as the major exception.

THE BATTLE over who's more important, over who has the key job, over whose skills are superior—that's a never-ending fight, and it's easy to feel sympathy for various viewpoints. But somehow, at this point, it seems more like a topic for debate—not a cause for declaring war.

Magnuson pushes for passenger service probe

Sen. Warren G. Magnuson (D.-Wash.) last week brought his campaign for the passenger train to the Senate floor. As a basis for the start of talked-about investigations, he said the ICC should find out first what intercity passenger service really costs the railroads.

"I have written to ICC Chairman Tierney and urged the Commission to conduct an investigation of certain aspects of railroad passenger service to supplement its earlier report and recommendations," said the chairman of the Senate Commerce Committee. "Because of the uncertainty and controversy that exists with respect to the matter of losses incurred by the railroads in providing passenger service, I have asked that this investigation focus on a determination of the actual net costs to the railroads in providing intercity rail passenger service and the means for reducing or meeting such costs."

Magnuson said the investigation would not have to be a formal ICC proceeding but the Commission should get the cooperation of all interests, especially the Department of Transportation and state commissions.

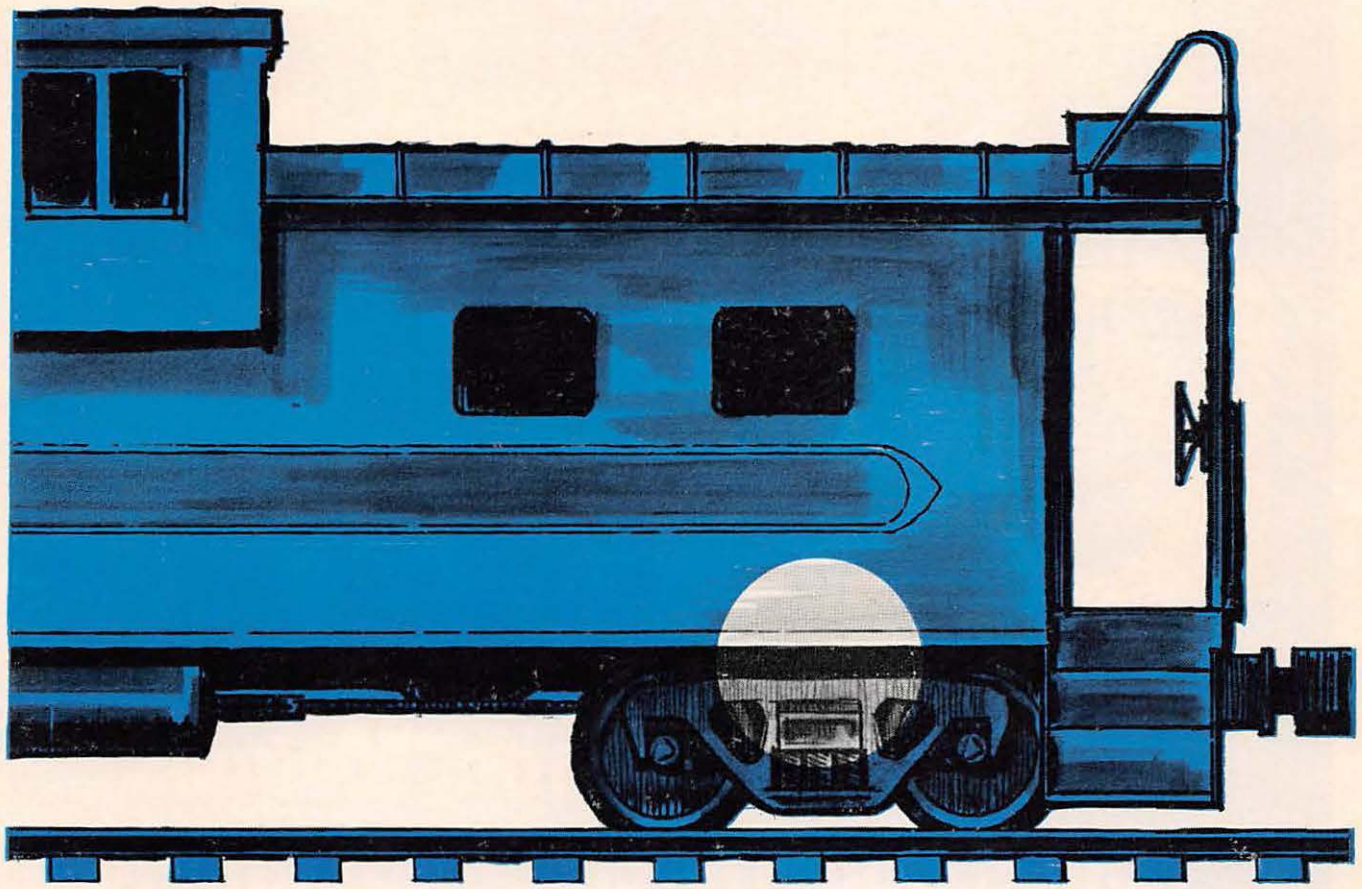
In addition to his letter to Chairman Tierney, Magnuson entered in the Congressional Record a letter from A. Scheffer Lang, Federal Railroad Administrator, that restated the DOT position supporting S. 3861, a bill for a two-year broadly-based study to be conducted with subpoena power. In the letter, Lang said a proposal by the National Association of Regulatory Commissioners would be a mere re-examination of past studies.

Magnuson said he thinks subpoena power wouldn't be needed because "the railroad industry has assured the Committee that they will cooperate."

Magnuson also said that if money for a study is requested in the next Congress, he would "strongly support the appropriation of such funds, and I am certain my colleagues on the Appropriations Committee, many of whom joined Senator Allott in co-sponsoring a resolution calling for such a study, will join me in voting in favor of needed funds. . . ."

The Magnuson request for a new cost study came in the wake of an ICC report which claimed that railroad passenger-train losses have been greatly overstated. The railroads replied that the ICC had failed to take into account taxes and rents which must be charged to passenger trains.

How can a crew go first-class in a caboose?

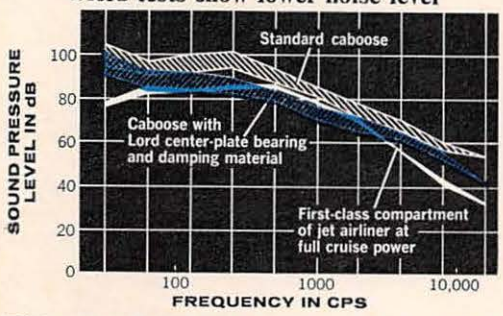


Lord knows.

Now a caboose can be quieter than the first-class compartment of a jet airliner.

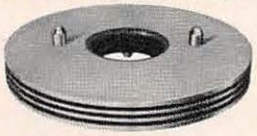
Here's proof:

Field tests show lower noise level



This dramatic noise reduction results from two Lord innovations: a new center-plate bearing, and structural damping material.

The bearing (shown here) is a bonded rubber-and-steel lamination installed in the center-plate. It isolates the caboose body from track and truck vibrations. Cushions annoying and fatiguing floor vibrations. Accommodates relative motion without lubrication or wear.



New laminated center-plate bearing.

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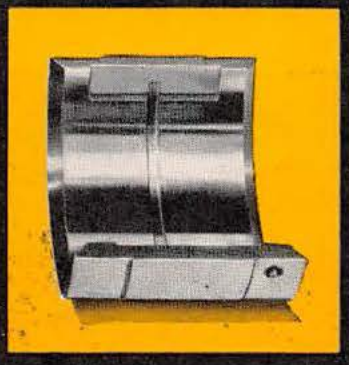

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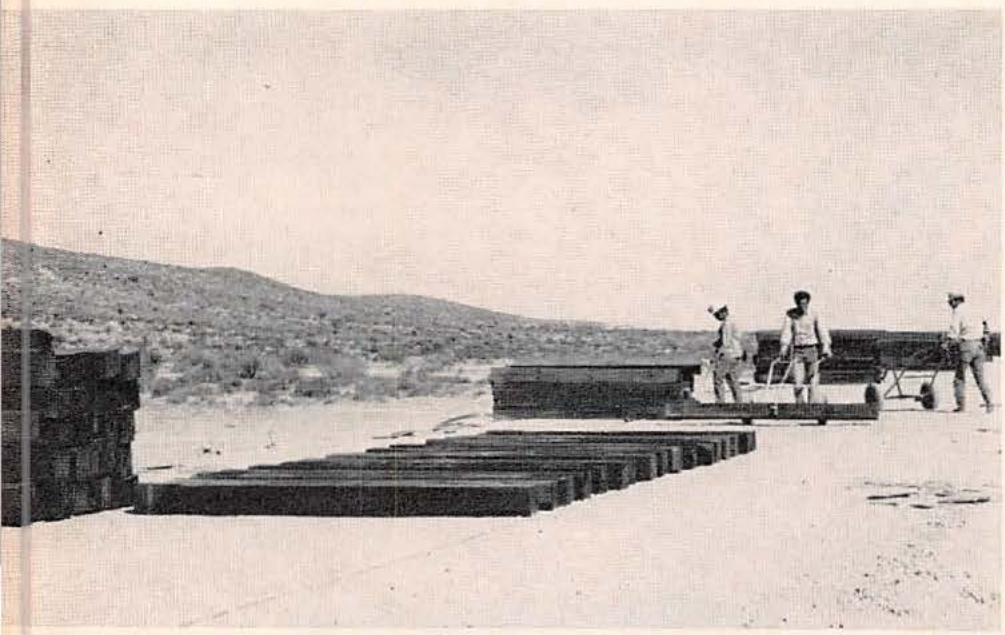
OPENING A CUT

Wheeled scraper, drawn by one tractor and pushed by another, excavates gypsum rock from a cut. A second scraper, wasting its load, is in the background.

FASTENING THE RAILS

Newly laid rails were spiked and anchored immediately behind the rail train (background). Ballast was unloaded as closely as possible behind these operations.

How MP overcame problems



HANDLING THE CROSSTIES

Distributed in bundles, crossties for the new MoPac line were placed individually on the subgrade by men using two-wheel hand carriers.

Service began over 27-mile branch in west Texas five months after start of construction. The problems encountered included lack of moisture and wide temperature variations.

Superficially anyway, it wouldn't appear that construction of the Missouri Pacific's Rock House branch would be any more than a routine project. The terrain in western Texas through which the 27-mile line was built is not particularly rugged. The cuts and fills are not of extraordinary dimensions, no tunnels were required. No unusual problems were encountered in avoiding excessive grades and curvature.

But surface indications can be misleading. Several factors kept this project out of the routine category. One was

to build a branch line fast

the arid nature of the country traversed. Among other things, it required the use of special measures to obtain the moisture needed to secure proper compaction of embankments. Another was the wide daily variations in temperature—from a low of about 58 degrees at night to a high of about 118 degrees in daytime during the summer months. With this spread to contend with, special precautions were necessary when building track with long welded rail strings.

• **Will serve sulphur plant.** Construction of the Rock House branch was undertaken to serve a single shipper —Elcor Chemical Corp. The line extends to a large plant Elcor is building in this remote location in Texas for extracting sulphur from gypsum rock. The plant is in the Delaware mountains, about 160 miles east of El Paso and 45 miles south of the New Mexico border.

Construction of a rail line was considered the only practical way of transporting the sulphur to distant markets. Negotiations between the chemical company and the railroad led to the decision to build a line to the plant from a connection with MoPac's main line at San Martine, Tex. The land through which the line had to be built supports only a handful of cattle ranchers. Average rainfall is about 9.5 inches annually. Even so, the occurrence of flash floods had to be considered. There is not a single village the entire length of the line.

• **Aerial survey made.** A governing factor in planning the project was the need to get the line into service at the earliest possible date to facilitate delivery of construction materials to the plant site. As the first step in locating the line, field work was started in October 1967 for an aerial survey, made by Buce & Gunn, Dallas, Tex.

Using contour strip maps developed from the aerial survey, MoPac engineers established the final alignment and grades. This information was given to the aerial survey firm as the basis for plan-profile sheets which were to serve as construction plans. The actual field location work was done by a local consulting engineer, working from these sheets.

To expedite matters, negotiations with contractors for grading, drainage structures and other work were initiated in mid-November, before the plans had been completed. "Appraisal of the proposed work," says Frank McGuigan, MoPac engineer of construction, "was made on the basis of a field reconnaissance, either by car or plane, over the proposed route. Selection of a satisfactory proposal of this work followed shortly."

• **Work gets started.** Negotiations for the necessary right-of-way were handicapped by the lack of finished plans and the absence of established land corners. Authorization to proceed was granted on Jan. 12, 1968. The prime contractor—the Border Road Construction Co., Monahans, Tex.—began moving equipment onto the job the following day. McGuigan explains that grading, construction of drainage structures and other work was begun at the main-line connection at San Martine and progressed toward the plant site to assure that construction of the track could be started at the

FLOOD PROTECTION

All bridges on the new line are standard MoPac concrete pile trestles. Slide slopes in stream were paved as protection from scour during flash floods.

earliest possible date without risk of interruption, pending completion of the roadbed.

McGuigan was directly responsible for all phases of the project. General supervision was exercised by J. G. German, assistant vice president, engineering, and E. T. Frazen, chief engineer.

Elcor's plant is at an elevation of 4,500 feet, about 850 feet higher than the starting point at San Martine. Inbound to the plant, the route climbs 200 feet in four miles. It then drops 250 feet in six miles and finally rises 900 feet in the remaining 17 miles to the plant site. McGuigan explained that original plans to hold the ruling grade to 1.5% could not be achieved in three miles of approach grade to the plant due to route change arranged by mutual agreement with a land owner. The ruling grade in this stretch is 1.75%.

• **Low central angle.** With the exception of an 8-degree curve at the plant site and a 2-degree 30 minute curve at the mainline connection, maximum curvature is 2 degrees. The average central angle per mile is 30 degrees. "Had not introduction of additional curvature been necessary to gain distance in areas of the heavy grades," says McGuigan, "the average central angle per mile would have been less than this figure."

Cuts range up to 20 feet in depth. The embankments have a maximum height of 35 feet. Construction of the embankments, including sub-ballast, required placing 1.6 million cubic yards of material. The bulk of the embankment yardage was obtained from 30 borrow pits scattered along the route.

Some cuts had to be blasted through limestone and gypsum formations. The gypsum was either placed in embankments or wasted. Hard limestone taken out of some of the cuts proved satisfactory for use as rip rap needed at bridge and culvert locations.

• **Moisture lack a problem.** Except for the temporary effect of infrequent rains, the ground in the area traversed by the new line contained no moisture. The result, says McGuigan, was the need to add 30 to 50 gallons of water per cubic yard to the fill material to secure satisfactory compaction. Procurement of water was a problem. Existing ranch wells and a railroad reservoir furnished the water needed for the first 10 miles of roadbed. Beyond that point, the contractor had to drill his own wells.

After a number of dry holes had been drilled, two producing wells were established, which provided the water needed for the balance of the project. Water was either piped or hauled from these wells. Temporary ponds established at intervals along the route served not only as truck-filling points but also as relay stations, permitting water to be pumped 17 miles to the west end of the project.

Plans called for placement of sub-ballast across the 22-foot width of the ground required addition of water to the ders served to protect the slopes from erosion. Sub-ballast was obtained from several sources. Weathered limestone in cuts at the east end of the line broke up sufficiently with ripping and grid rolling to serve for this purpose. The balance of the material needed was obtained from four pits spaced along the route. Two pits furnished crushed rock screenings. The other two furnished caliche.

• **Concrete-pile bridges.** Drainage structures include eight bridges, all of which utilize MoPac's standard concrete-pile trestle design, totalling 66 28-foot panels, and 53 corrugated metal pipe and pipe arch culverts ranging from 24 inches to 84 inches in diameter. Except for approximately eight miles of valley crossing, the location of the line is generally side-hill in nature. Thus, the pipe and arch culverts are primarily required for side-hill drainage, explains McGuigan.

Construction of the drainage structures was influenced by the dry conditions and also, McGuigan explains, by the fact that the limited rainfall frequently occurs in heavy concentrations in localized areas. Combined with the steep slopes and general scarcity of vegetation, these storms result in serious flash floods.

To provide protection from the destructive effect of these floods, all culvert openings and bridge ends, except in rock fills, are protected with either rip rap or paved slopes. Slopes were used particularly where there was a risk of floods in the form of walls of water.

• **Pile holes prebored.** The dry conditions had a bearing on the construction of the concrete-pile bridges, McGuigan says. On the one hand, pile driving was simplified by the dry stream-bed conditions at all locations. On the other, the dry sub-soil necessitated preboring pile holes to within about three feet of the desired penetration. And the absence of moisture in the ground required addition of water to the prebored holes as the piles were placed for driving. "Omission of the water," says McGuigan, "reduced the penetration possible despite use of a hammer well above specification requirements. In one major stream bed, difficulty was experienced boring through a strata of cobblestones at a shallow depth below the surface."

In mid-April, when 18 miles of grading and eight miles of sub-ballast had been completed, distribution of ties, tie plates, spikes and anchors was started. The plates were placed on the ties as they were spaced on the track center line.

• **Rail is butt-welded.** These preparations were influenced by the decision to place the rail in the form of 1,440-foot welded strings. This decision, says McGuigan, was consistent with a need to provide a satisfactory, minimum-maintenance operation.

Another decision was to construct a roadbed suitable for mainline operation, which, it was felt, was justified by the tonnages expected to move over the line. The 112-pound rail was provided from the MoPac's current relay program. It was welded into the long strings in the road's butt-welding plant at North Little Rock, Ark., which meant that the haul for the long rails from the welding plant to San Martine was 830 miles. Six round trips for the rail trains were required. Much of the other materials, including ties and concrete piles and bridge slabs, was hauled the same distance.

Rail laying was done by company forces. The first of 219 long rail strings was unloaded on the ties on May 11. At that time, 24 miles of grading had been completed, along with all pipe culverts, 15 miles of sub-ballast and all but three bridges.

• **How rails were laid.** In the rail-laying, the long rails were pulled off the rail train two strings at a time by a Speed Swing equipped with a straddle-axle attachment to permit the rubber-tired wheels to straddle the ties. This operation was facilitated by special rail rollers placed ahead of the unloading operation. After a pair of strings had been unloaded, and the rollers removed, the rails were spiked to gauge

at every fifth tie. The rail train was then advanced to the ends of the strings just placed and the process repeated.

Spiking and anchoring of the newly laid rails were completed immediately behind the rail train. Ballast was unloaded at the rate of approximately 28 cars per mile, as closely as possible following the rail-anchoring operation. When unloaded at this rate, it filled the track section to the top of rail, affording, says McGuigan, a reasonable restraint against expansion in the welded rail.

Delivery of ballast at a rate sufficient to meet scheduled needs was thus especially important on this project. Crushed granite ballast was obtained from a small quarry on the main line 60 miles west of San Martine. In anticipation of the project needs, a large stockpile was accumulated at the quarry prior to the start of track construction. Ballast was delivered by a pool of side-dump hoppers averaging 100 cars. In an effort to meet the scheduled needs of the project, direct loading of the cars from the crusher was supplemented by loading from the stockpile.

● **Sun kinks a problem.** Any delay in unloading ballast on the track, or lack of initial coverage of the track, could result in sun kinks, McGuigan notes. Although most sun kinks could generally be lined out during the cool temperatures of the following early morning hours, such conditions constituted an undesirable additional item of work.

It was May and June when the track was laid. Because of the wide temperature variations that occur then in that part of the country, it was advantageous, explains McGuigan, to perform the initial raising and lining operation after 11 p.m. when the rail had cooled. Otherwise, problems could be caused by stresses built up in the welded rails by the high daytime temperatures.

Raising and lining operations were performed by a Jackson Servochief for jacking and tamping, a Kershaw liner with Nordberg Line Indicator for lining, and a Kershaw Ballast Regulator. The latter machine plowed the ballast down to expose the rail heads for improved operation of the tamper clamps.

Sulphur shipments are not scheduled to start until later in the fall. Traffic being limited until then primarily to shipments of inbound construction materials for the plant, final surfacing, lining and ballast dressing were deferred to cooler weather. The track will be brought to final line and surface prior to the start of sulphur shipments.

Progress was such that rail was laid through the plant yard by June 16. The first revenue loads were spotted at the plant site on June 18, five months after the grading contractor moved onto the site. ■

WALTER TAFT

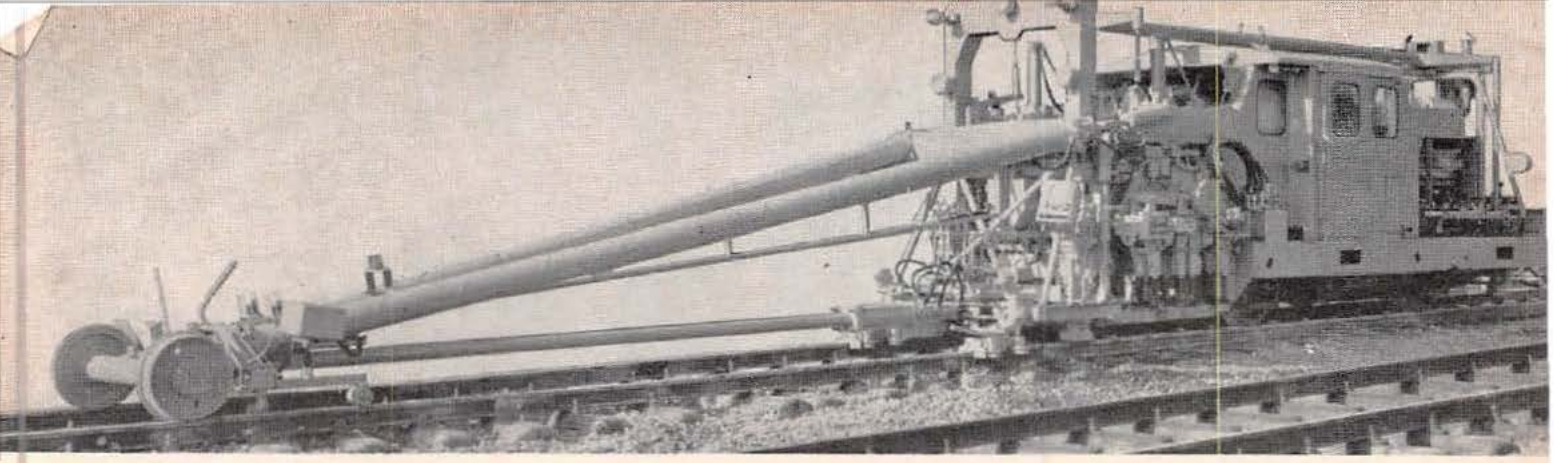
WATCHING WASHINGTON

WEATHER FORECAST—If history does repeat itself, the Washington political climate for railroads will not change much, if any, after the forthcoming election. What the industry regards as sound principles have been enunciated by both Democratic and Republican Presidents, or their Cabinet spokesmen, for the past quarter century. Implementation has been the problem. And the relatively little implementation which did come was not party-oriented.

IN 28 YEARS—Principal implementers of railroad proposals have been the Transportation Act of 1940, which brought domestic water carriers under regulation, and the 1958 Transportation Act with its rate-freedom and service-abandonment (so-called train-off) provisions. The 1940 Act came in the Administration of the late President Roosevelt, a Democrat, and the 1958 Act was passed when Eisenhower, a Republican, was President. Latest significant transport legislation, of course, was the act creating the Department of Transportation, which was sponsored by the incumbent Democratic President, Lyndon B. Johnson. Railroads supported the DOT act, but it was not a top priority item.

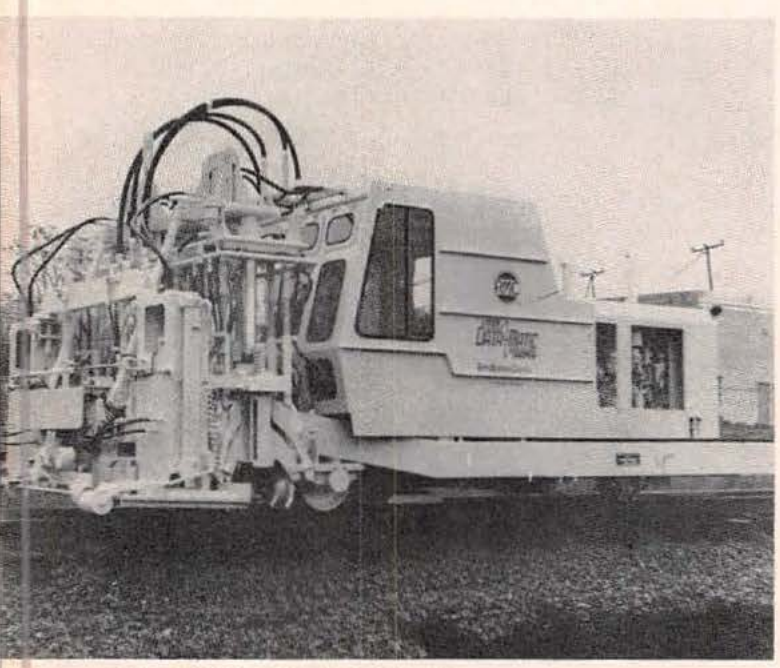
REPORTS, TOO, A NON-PARTISAN HABIT — Meanwhile, the various Administrations have come up with their transport reports. In the Roosevelt Administration, the 1940 Act came in the aftermath of reports by two Presidentially-appointed committees, known as the Committee of Three and Committee of Six. The former consisted of three members of the ICC; the latter was comprised of three railroad executives and three railroad labor leaders. The Administration of President Truman had its Sawyer report, so-called because it came from a committee headed by former Secretary of Commerce Charles Sawyer. The Eisenhower Administration had its Weeks report from a committee headed by former Secretary of Commerce Sinclair Weeks.

ZEALOUS IMPLEMENTER NEEDED—Then came the late President Kennedy's 1962 Transportation Message which endorsed the top priority items of the railroad industry's legislative program. These items are the calls for freedom to make competitive rates, freedom from inequitable regulation and subsidized competition, and removal of restrictions on railroad operations of other forms of transport. President Johnson endorsed the Kennedy proposals. So, in his own way, every President of recent years has talked sound transport legislation. None has become a zealous implementer.



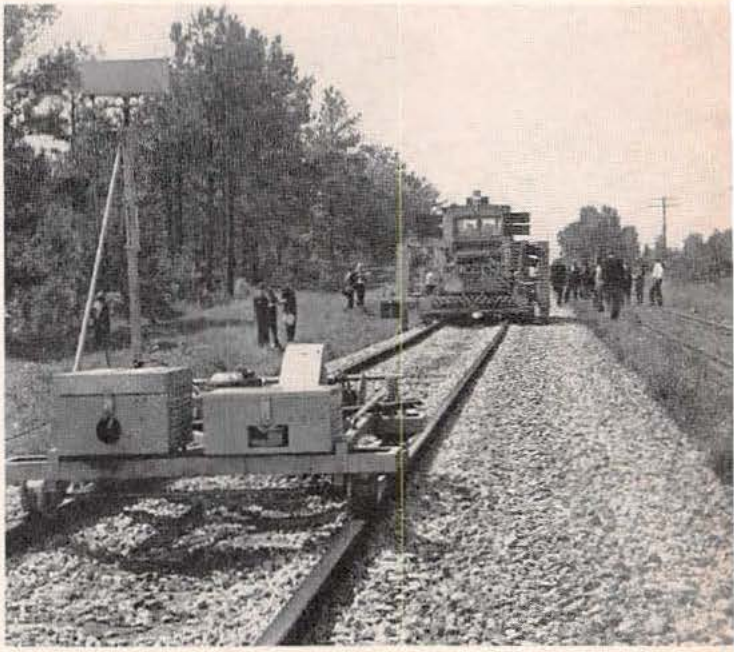
FAST TAMPING OPERATION

Matisa Model 80 machines are available with either a single or double tamping head. Arching principle is used for jacking.



AUTOMATIC PROGRAMMING

RMC Datamatic can program surfacing and lining automatically or by semi-automatic and manual means.

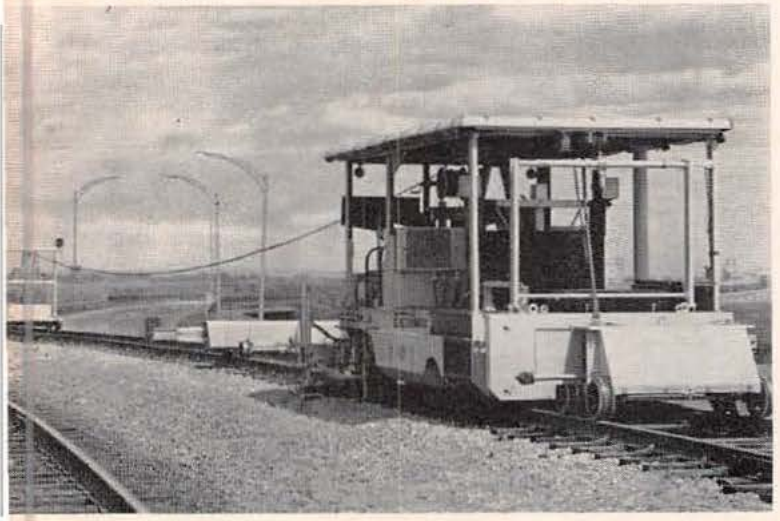


LIGHT BEAMS USED

Jackson Model 4500 tamper uses automatic controls actuated by light beams projected from self-propelled buggy.

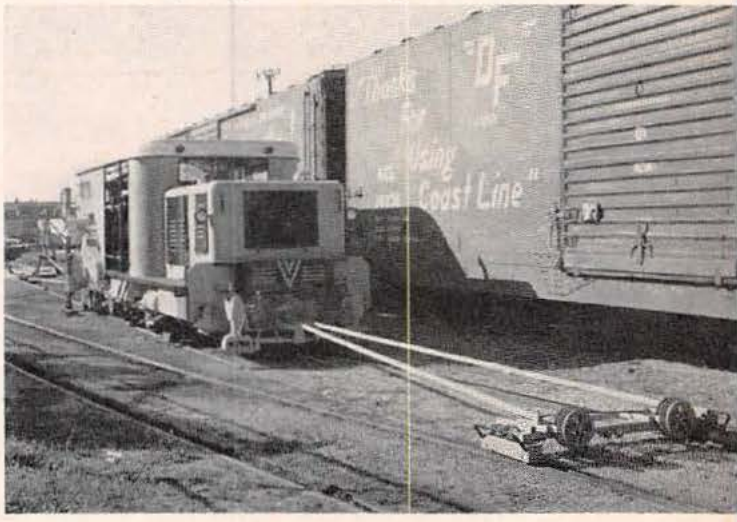
INFRARED BEAMS

Autojack Electromatic Autoliner uses infrared beams from a self-propelled forward carriage to control jacking and lining.



TWO TIES AT ONCE

Plasser Duomatic tamps two ties simultaneously. Infrared beams control jacking; two-chord system controls lining.



Track machines pay big dividends

Among the benefits that are derived from multi-purpose track machines are higher production rate and improved work quality.

The newest types of track-maintenance machines are producing results in terms of greater production per man-hour. There is also an improvement in the quality of the work done. At the same time, the matter of getting maximum production from these more-sophisticated machines is presenting a challenge to the track forces.

No better illustration of the truth of these general statements can be found than in a specific—the multi-purpose machines that have come into use in the past few years for raising, tamping and lining track. These machines incorporate in a single unit, operated by one man, three operations—jacking, tamping and lining—that previously had been performed by separate machines each with an operator.

What has been the experience with these multi-purpose units? Have they produced the savings they were designed to accomplish? Have they introduced any new problems?

Answers to these and other questions about the multi-purpose machines were contained in a committee report to the annual meeting of the Roadmasters' Association. Chairman of the committee was E. B. Keeling, assistant general supervisor-work equipment, Southern Pacific.

● **Fewer operators needed.** The multi-purpose machines were cited in the report as an example of equipment that results in a reduction in machine operators. The committee noted that track-surfacing gangs "previously comprised of two multiple tampers, tamping jack, track liner and ballast regulator, required five operators plus an average of five laborers and a foreman, or a total of 11 men. By contrast, with the advent of multi-purpose machines, the sophisticated tamper is worked with a regulator, requiring only two operators, three laborers and a foreman.

In a discussion of production, the committee said the automatic lining and jacking devices incorporated within the high-production tamping machines, "are reported to have speeded up tamping to the extent that these units are performing up to 75% more work than with the single-function machines." Members of the committee, the report added, were unanimous in reporting higher production rates.

● **On-track time a factor.** At this point the committee noted several factors "that play an important part in whether the high production rates are maintained consistently." Among these factors it mentioned the total time the multi-purpose machines are non-productive because of mechanical problems, the available on-track time, the loss of production because of inexperienced operators and mechanics, and vandalism.

Reporting on the important matter of work quality, the committee said the quality of the work performed by the new machines is considered superior to that obtained from the older, single-function machines. "Greater accuracy and more consistent work," it said, "are accomplished through automatic control which removes the human element and personal judgments."

● **Some "handicaps" noted.** On the other hand, the multi-purpose machines, in the opinion of Keeling's committee, have created a number of "handicaps." Elaborating on this point the committee said: "Malfunction of any individual item . . . stops production of all functions. With the single-function machines, productive work can be continued on a limited basis if one of the machines is temporarily out of service. Size of machines has a tendency to decrease on-track time. Better qualified operators are required to keep the machines in operation at a maximum efficiency. Better qualified mechanics are required to trouble-shoot and keep these more complicated machines repaired and maintained. Greater knowledge is required of all concerned, including supervisors, in order to obtain full potential from the equipment."

Programs for keeping the multi-purpose machines (as well as other types of equipment) in repair, and of training mechanics, came in for considerable discussion by the committee. While the great importance of equipment maintenance was stressed by all members of the committee, the majority of them, according to the report, "admit their maintenance programs are inadequate to meet the mounting demands. Preventive maintenance is strongly advocated, but most railroads are admittedly slow in developing programs."

● **How much training?** The question of how elaborate training programs must be for mechanics if they are to keep pace with increased equipment use and automation, attracted a considerable amount of attention from members of the committee, the report said. "All were seriously concerned," it added, "as to whether or not adequate measures are being taken within their respective properties to cope with future needs. Several reported their belief that they were losing ground because they were not developing training programs. Some feel that labor agreements are seriously hampering their efforts to obtain the high caliber of operators and mechanics needed.

"Still others feel that their organization has developed to a point that they are now gaining on previously lost ground, and that through continuation of education they are confident they will keep pace with the future. It is the consensus that in this area lies the key to the success and advancement of the automation era."

The committee reported agreement among its members that the "railroads must continue to utilize the most modern equipment available in order to perform track maintenance at the least cost. In adopting the use of modern equipment, we must obtain the full potential from it to maintain our competitive position in transportation. In order to achieve this potential, we must continue to develop supervisors, mechanics and operators through proper education." ■

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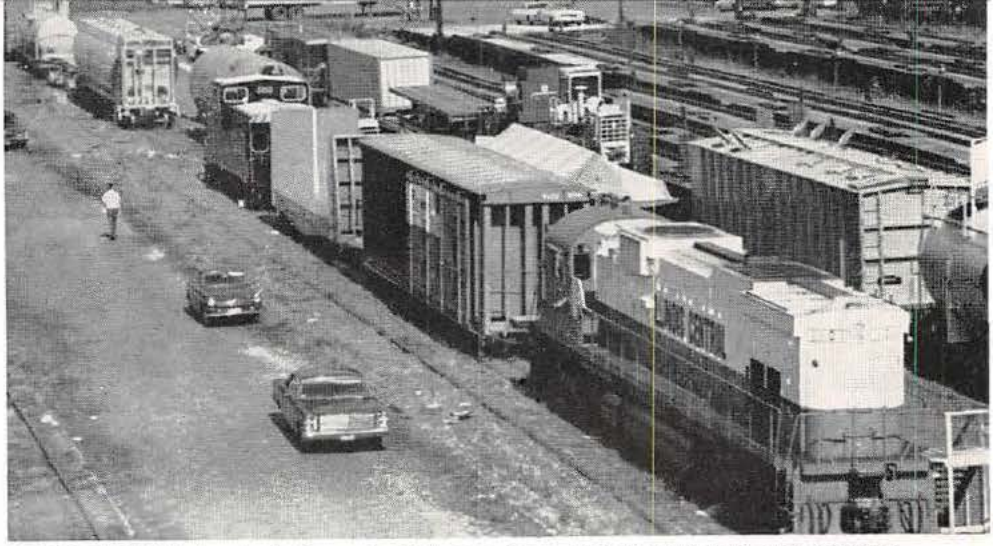
Mechanical men face new challenges, capabilities

Equipment exhibit is feature of 1968 Coordinated Meetings.



TRACK EXHIBIT involved dozen freight cars from various builders and 3600-hp Alco unit. Scope of outdoor display was cut when supplier interest lagged.

EQUIPMENT DISPLAY at Sherman House found almost a hundred suppliers showing railroad mechanical men new developments for cars and locomotives railroads are expected to order if traffic continues at recent high level.

New technology is adding new dimensions to railroading . . . and many of these new capabilities and challenges are involving railroad mechanical departments. The changes were exemplified by both the discussions and exhibits at the recent Coordinated Associations meetings in Chicago.

"Trains must run on time — that is basic, but not enough," warned T. R. Klingel, senior vice president, Soo Line, while speaking to the Car Department Officers Association. *"Cars* must also run on time; it does no good to have the train on time only to find the shipper's car was set out bad-order en route."

The only management control of the past, explained Klingel, was the on-time performance of trains. "But the advent of the computer," he observed, "has made it possible to follow schedules of cars, rather than of trains. With all the trains on schedule, it is surprising the number of cars that are off schedule — that have missed connections somewhere en route"

● **Four challenges.** Klingel told CDOA members that it is their function, and that of the other industry associations, to study and direct needed changes. He explained that American business, having refined productive processes so completely, is now looking to distribution as a fertile field for cost reduction. It is here that the freight car becomes so crucial and Klingel spelled out four areas where rail transport must be fitted into new distributive concepts.

—Transportation must be reliable, with cars, as well as trains, on time;

—Products must arrive in good condition with rolling stock designed so that cars, once loaded, "can move to destination without further delay for straightening or transferring loads and with assurance their loads will arrive intact;"

—Size of shipments must be variable with products received in reasonable units of consumption, requiring a broad range of competitive and effective services from trainload to container-size shipments;

—Railroad cost levels must be controlled through increased productivity —particularly from the dollars invested in freight equipment. Klingel sees each of the four problem areas reaching a "crisis level" and warned that "the pace of change does not permit railroads the leisurely pace of progress they have been following.

NOT DIFFERENT was J. W. Hawthorne's comparison of methods to be used by tomorrow's railroads, general industry.

● **Prototype of change.** The pace and manner of general industrial change will have to be matched by railroads, J. W. Hawthorne, assistant vice president — equipment, Seaboard Coast Line, told the Locomotive Maintenance Officers Association: "Railroading is not an art evolving in a vacuum, but an integral part of industry, using the tools of industry and progressing in step with, and sometimes leading, industry. The old days are gone when railroad men could enjoy the luxury of handling matters in a manner entirely foreign to outside industry simply because railroads were, in some vague way, different."

"Tools of railroading," Hawthorne predicted, "will gradually leave the specialized stage and be adaptations of the tools of industry, just as the diesel locomotive is an adaptation of the automobile and the lowly street car." He pointed out that no railroad is large enough to maintain a staff capable of developing the reliable locomotives and failure-free freight cars that will be needed. He added that tomorrow's railroads will increasingly specialize in their chosen field — transporting people and goods for a profit, and gradually will depart from the manufacturing of, and heavy repairs to, the tools of this trade. He warned mechanical de-

partments to alter their personnel programs so they will not become saturated "with professional engineers, amateur economists, and out-of-date shopmen."

• **Technological gaps.** Railway technology still has many gaps, according to H. W. Hayward, chief of motive power and rolling stock, Canadian Pacific. He told the Air Brake Association that at a time when the TV viewing public can watch two 17,000-mph space craft being coupled in orbit, railroads do not have a satisfactory air hose gasket and, as a result, have not solved the problem of brake pipe leakage. He added today's freight trains cannot be handled without slack action and that there is no brake shoe which can produce satisfactory stops without undue wear.

C. R. Zarfoss, vice president, Chesapeake & Ohio/Baltimore & Ohio, observed that the smaller railroads of the past were less affected by outside influences and demands. Railroading was "an art—not a science; a cult—not a business." But, he told the Railway Fuel and Operating Officers Association, "because technology changes and because new, improved tools become available, railroaders do not automatically change. The increased demands on them require railroaders to be more informed, adept and effective."

• **Remote control.** The growing popularity of the remotely controlled mid-train locomotive unit was discussed by both the Air Brake and Railway Fuel Associations. C. W. Parker, assistant chief of motive power and rolling stock, Canadian Pacific, described his road's use of Locotrol on a road unit and power car assigned to operate over the plus 2% grades between Calgary, Alta., and Vancouver, B.C., including the 5-mile Connaught Tunnel in the Rockies. CP is particularly interested in the remote concept for unit coal trains it is introducing, but concludes that the slave unit should justify itself in general service.

Penn Central has been appraising a Wabco RMU slave operation over the Berkshires of western Massachusetts on its Boston & Albany district. Again the concept won approval, although it was observed that the improved propulsion system which is possible should be fitted into a road's operating pattern and "the operating pattern not tailored to the propulsion."

• **Planning and capital.** Not enough thought, planning and capital have gone into the solution of piggyback problems, reported CDOA. It was stressed that there is definite need for better communication and better education regarding trailer interchange. Many of the problems resulting from the present volume and existing handling methods must be overcome to assure future growth of this high-revenue traffic. ■

LUTHER MILLER

AS THE EDITOR SEES IT

CONGLOMERATES —What is a railroad conglomerate, anyway? Is it control of other enterprises by a railroad—or is it control of a railroad by other enterprises? Who stands to benefit—the railroad over the long term; or other members of the corporate family over the short term? When questions like these are asked by outsiders, the conglomerate-makers tend to reply, with just a trace of impatience, "What's good for the railroad company is bound to be good for the railroad." But is this necessarily so? Some railroaders aren't convinced. One of them is Perry M. Shoemaker.

QUESTION NO. 1 —Mr. Shoemaker, a former railroad president whose credentials as a serious student of the industry are impeccable, posed some intriguing questions on the subject of conglomerates at a recent University of Maine transportation seminar. While making it clear that he was not questioning the underlying sincerity of present conglomerate-makers, he did ask (1): "Is it conceivable that this type of industrial expansion has been motivated in substantial part by attractive railroad tax carry forward nest eggs? Is it conceivable that in a conglomerate or diversified company there can be *continued* usefulness for a *lack* of railroad earnings?"

QUESTIONS 2 AND 3 —He asked (2): "If there is such an element of corporate usefulness, what is the possible effect of this upon capital improvements, research and development, and the quality of service to the American public?" He asked (3): "If there is such attractiveness, what is the effect upon the individual railroad man if the business purpose of his particular company does not drive him for greater efficiency and improved productivity, and the development of new and superior kinds of service. . . ?"

AND QUESTION 4—After observing that present diversification moves have been engineered by men whose devotion to railroads may be beyond question, he nonetheless noted that "changes in management occur rapidly these days," and asked (4): "Will following managers of these over-all enterprises have an equal recognition of quality public transportation being a heritage and trust which the country cannot do without? Or can there be a deterioration in railroad transportation resulting from the motive of corporate profit standing alone? Or from management emphasis being on some other activity?"

ANSWERS?—These questions are not going to go unanswered. If the answers don't come from the diversifying railroads, they are likely to come from less friendly quarters.

"Do Standard components

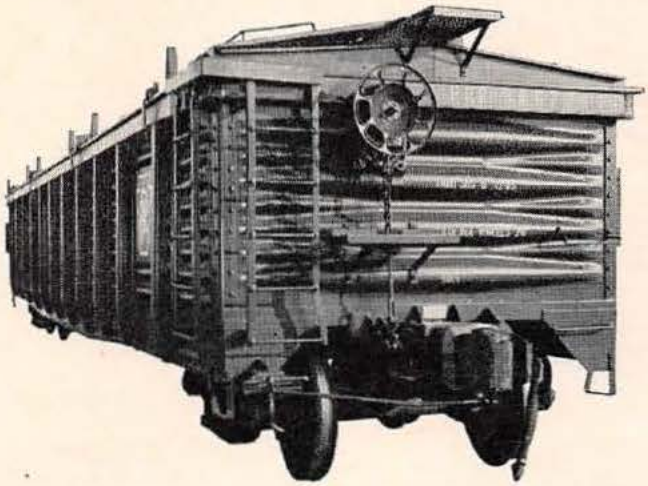
No, pretty much on the sides

Standard corrugated sides, pictured on new gondola. This modern, covered gondola, PRR-designed, provides all-weather protection for the transportation of various steel commodities.

If your railroad cars have sides, ends, roofs or floors—if you intend coupling them to other cars—then Standard components can save you money. The proof is easy to have: just phone your Standard representative.

go everywhere?"

...the ends ...and the roof



Above: Standard 3-piece removable roof, showing inspection hatch.

Left: Standard dreadnaught steel ends and coupler centering device.

STANDARD RAILWAY EQUIPMENT
division of STANRAY CORPORATION

MEMBER RPI RAILWAY PROGRESS INSTITUTE

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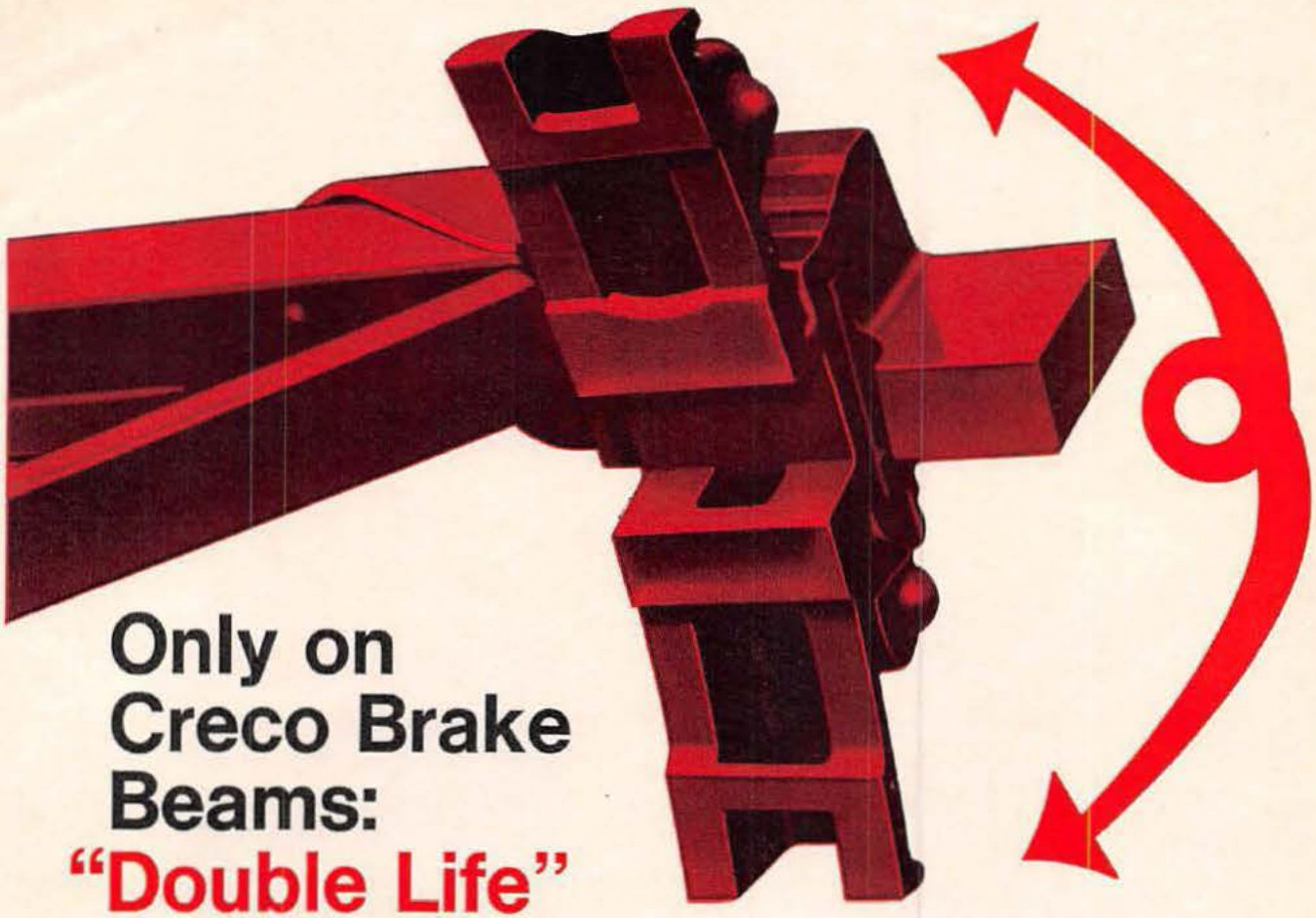

Only on Creco Brake Beams:

"Double Life" Reversible Brake Heads

- **outlast ordinary brake heads**
- **cut brake head inventory in half**

Only Creco Hangerless Type Brake Beams have brake heads reversible left-to-right, top-to-bottom. When one side wears out, just reverse the heads and life is doubled. And, since each head is either right or left, you only need half the inventory required for ordinary, non-reversible, brake heads. Creco strap-type tension member also eliminates need for threaded rod and nuts.

All brake beam parts renewable. No stronger brake beams on the market. Backed by 77 years' manufacturing experience: "The Standard of the Industry."

CRECO HANGER TYPE BRAKE BEAM is the original hanger beam and still the finest. All told, Creco has sold more than 15 million hanger and hangerless beams since 1891.

CRECO BOTTOM ROD GUARD one-piece construction, fits all brake beam sections, locks to eliminate rattling and wear.

DREXEL SAFETY SUPPORT reduces wear on brake heads, hangers, hanger brackets. It supports *and* guards. Easily installed—no welding, no special tools.

CHICAGO RAILWAY EQUIPMENT DIVISION

EVANS PRODUCTS COMPANY

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What can C&S men do about profits?

Computers, centralized controls, sophisticated coding systems show way to profitable railroads, C&S Section meeting hears.

"Management expects you to conduct yourselves and lead your people with one thought in mind—that you strive to improve the profitability of your railroad," stated keynote speaker J. H. Brown.

Frisco's assistant vice president-general manager told AAR Communication & Signal Section members in Dallas, Texas on Oct. 1 that "you are a service group. Your signal systems serve the transportation department in running trains. Your communication systems are the nerves that extend the reach of administrators.

"You can and should make it your business to know a great deal about the needs and workings of other departments. Transportation may not know about a new signal device, for example. You are expected to keep abreast of new developments and provide the signal systems and communications facilities that will tie all the scattered pieces of a railroad into one cohesive whole."

• **Be profit makers.** "As you develop the philosophy of looking beyond department lines you may see where you can spend $10 of your budget and save another department $20, and that is certainly worthwhile," Brown said.

Some $10 million worth of equipment, test gear and systems were on display at the Dallas meeting to help make C&S men profit makers. Ten technical papers laid heavy emphasis on the space-age techniques now available for railroad application.

Harnessing a third-generation process control computer to an automatic retarder classification yard, for example, has produced total terminal control. TTC provides:

—Sharply increased throughput.

—Sharply decreased paperwork.

—Substantial reduction in lading damage.

—Better equipment, track and labor utilization.

—Instant car location information.

WABCO's TTC system automates the railroad terminal, said technical paper authors C. F. Wert, manager-railway sales, and G. F. McGlumphy, manager-terminal and industrial systems development. The system includes responsibility for operations and inventory in the areas of pre-arrival, receiving, humping, train make-up, departure, industrial and interchange yards, and service facilities.

• **Process controls.** The process control system provides communication networks for information flow for control of the entire terminal. Included in the networks are digital data links for:

—Printed messages on switchers.

—Car inspectors reporting to the process control system.

—Switch foreman control of locomotives and switches.

—Automatic car identification scanners, field safety logic and wayside devices reporting to the process control system.

—Plus selective voice communications between personnel, and interface between operating headquarters and other terminals.

SP TOPS ready by 1970

In another area of total systems control, Southern Pacific will have its TOPS (Total Operations Processing System) in operation by 1970. Key elements will be two IBM 360/65 computers or central processors, reported John N. Albertson, general superintendent communications-system.

"One computer is used for on-line data collection and processing, the other is maintained as standby for the on-line unit and it is used for off-line storage and processing of information passed to it from the on-line machine. Connected to the central computer are approximately 430 input/output units. The information transmitted or received via I/O stations will be handled over 198 data circuits," Albertson reported.

• **Microwave is king.** To connect these widely scattered input/output stations along SP lines, microwave is the all-important nervous system. SP is now installing a 760-mile link from El Paso to Houston, Texas. When completed, SP will have 3,380 continuous route miles of microwave from Portland, Ore., to Houston. Albertson said the system consists of 118 active repeater stations and terminals, and is providing a reliability of 99.9999% per microwave repeater section.

Sophisticated coding techniques, many involving digital-type transmission of controls, have provided C&S men with new, faster and more reliable systems. The combination of speed and reliability has increased the capacity and safety of these new systems.

• **More communications.** New coding techniques can now provide up to 24 voice channels on four wires in a cable system. Additionally, each of these voice channels could provide up to seven standard telegraph circuits. If all voice channels were converted for teleprinter use, such a system could provide 168 printing telegraph circuits from only four wires.

This high-efficiency use of wires is accomplished by pulse code modulation (PCM), a new coding technique described by Western Union engineers. C. C. Batterson, assistant vice president and Russell G. DeWitt, manager of transmission systems engineering, described successful application of PCM to standard WU cable systems.

PCM operates on the principle of sampling, at a very high rate, the communications message, then transmitting it at high speed, in digital form, over a communication line. At the receiving end, equipment takes the digital samples and recreates the original message. The speed of such operations is so high that ordinary voice conversations are handled without any degradation in quality, and the talkers do not know that their speech is being chopped up into small bits.

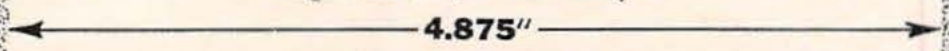
• **Other coding techniques.** Similar, but different, digital coding techniques have provided systems whereby radio remote-controlled vehicles and devices can be handled efficiently. For example, General Railway Signal Co. has developed a system "which allows the simultaneous remote control of numerous pieces of equipment on a single radio channel. This system is especially applicable to the remote control of track switches, locomotives and other vehicles," reported Carl G. Shook, section manager of electronics and communication design.

This radio remote control provides the operator with a small portable transmitter with pushbutton operation. The system has been successfully operated in controlling 32 mine locomotives on one radio channel. The environment, Shook said, includes 350 to 600 kva electric power lines, as well as voice radio on nearby channels.

Another radio control system, making use of a microwave link, is used for

TRUCK

A typical truck engine has a bore of 4.875 in. Thus there is a circumference of frictional contact between piston and cylinder wall of 15.3153 in. This circumference encloses 18.665 sq. in. of combustion area—for what you might call a "friction vs. power" ratio of about 5 to 6. That is, in an engine this size, it takes nearly an



inch of contact between piston and cylinder wall to produce a square inch of combustion area.

The oil companies have done such a wonderful job of fighting metal-to-metal friction that it's easy to forget that there is a tremendous amount of *fluid* friction between the sliding pistons and cylinder walls of a reciprocating engine.

Why trains carry a given load with so much less fuel

(Part of the hard-rock founda

LOCOMOTIVE

A typical locomotive engine has a bore of 9 in. There is a circumference of frictional contact between piston and cylinder wall of 28.2743 in. The circle encloses 63.617 sq. in. of combustion area for a "friction vs. power" ratio of about 4 to 9. That is, in an engine of this size, it takes less than one half inch of contact between piston and cylinder wall to produce a square inch of combustion area—*with only about half as much opportunity for fuel-consuming friction as in the truck engine.* This friction is a sizable factor. One automotive manufacturer has estimated that at 30 mph, more power is expended to overcome friction within the engine than is delivered to the rear wheels. In fact, now that engine parts are fitted so tightly, friction has become such a factor that they don't give you a crank with even a small car any more.

(It's not "compression" you brake with when you shift to a lower gear on a downgrade. It's *friction.* Actually, the compressing in one cylinder is balanced by the simultaneous decompressing in another.)

One of the laws of geometry is a controlling factor in modern mass transportation. The law, worked out in some detail at the left, is this: the bigger the cylinder, the less wall surface it takes to enclose a given volume. Thus it is that for each cubic inch of engine displacement, there is only about half as much opportunity for piston-cylinder wall friction in a giant railway locomotive as in a highway truck.

But the reason why a gallon of fuel gets a lot more done on a railroad than on the highway goes even further than this. Not only does each unit of the expanding fuel meet with less resistance inside the locomotive engine, it meets with less resistance on the railroad track, too. A truck's pneumatic tire is constantly flexing as it rolls along —with tremendous friction and resistance to forward movement. (That's why a tire gets so hot.) On the other hand, the most friction-free movement known to man is of an unflexing steel wheel rolling on a steel rail.

All in all, the train has a tremendous advantage over the truck in operating economy.

Today, the railroads and their suppliers are fast developing other train advantages, too: bigger and more efficient cars, new loading and unloading devices, better signalling and communication, wider computerization.

How do railroaders keep up with all this? Every Monday, they turn to RAILWAY AGE. What a place to offer *your* advantages!

Be part of the weekly excitement in

RAILWAY AGE

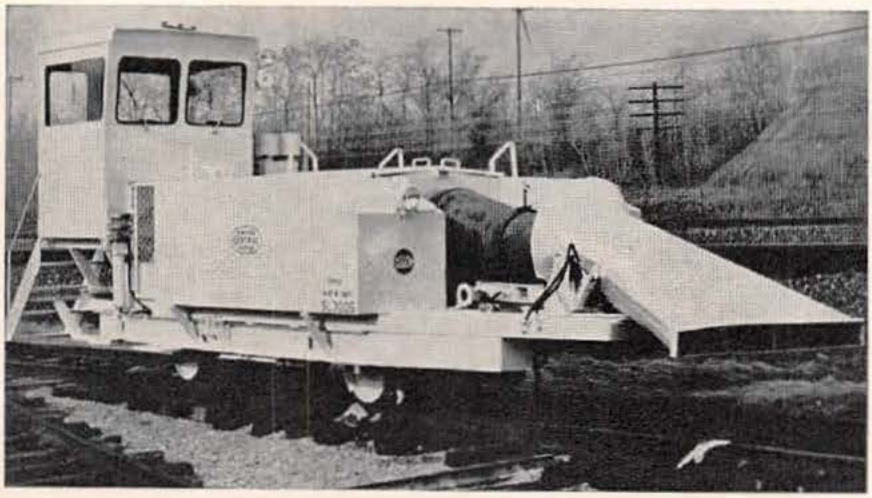
the transportation weekly

tion of the new railway age)

Typhoon or Hurricane...

Clear . . . Snow . . . Fast!

TYPHOON Removes snow down to frozen ballast—from around switch rods, operating rods, from under stock rails and switch points. 160 mph wind blast distributes snow to atmosphere. Shown is self-propelled Typhoon with heated cab. Skid-mounted and wheel-mounted versions also available.



HURRICANE Essentially a jet engine mounted on a self-propelled, rail-mounted car, Hurricane directs a continuous blast of high-velocity air (650 mph) at snow on tracks. Very effective for removing snow from tracks and switches in heavy snow territory.

RMC

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Machines built in Pittsburgh, Canada, West Germany and Australia

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remotely controlling track switches in a large open-pit mine.

• **Mobile teleprinter.** It is now possible to send written messages to train crews in locomotives and cabooses, to trainmasters in automobiles and to maintenance-of-way foremen working out on the line. The means is a new printing telegraph receiver operated by a radio set in the same vehicle. VHF radio is the link between the mobile teleprinter and the base station location.

Advantages of the radio teleprinter are:

—Fewer human errors.
—Saves time.
—Permanent messages.
—Unattended operation.
—Automatic routing.
—Increases safety.
—Privacy.

Messages can be generated by a computer, punch card device, or teletypewriter. William M. Borman, engineering manager, Motorola Communications & Electronics, said that the mobile teleprinter operates at 100 words per minute. It is a receiving-only device, and the person receiving the written message acknowledges via voice radio.

However, development work is under way for two-way communications whereby the person out in the vehicle or locomotive would use a keyboard device to provide a written acknowledgement.

• **Reduces signal costs.** Another coding technique applied to signal track circuits promises reduced costs for installing and maintaining signal systems. Known as PMC or pulse modulated controls, this Marquardt Industrial Products Co. development can reduce the number of insulated joints required in signal systems.

An installation of PMC track circuits in electrified territory shows that it is compatible with propulsion return currents and coded cab signal systems. "Furthermore, these tests have proved that it is possible and most practical to eliminate insulated joints with a resultant savings in impedance bonds at all locations.

"In order to periodically repeat the available frequencies [for various signal controls] it was decided to retain those [insulated] joints at home signal locations only. It will also be necessary to retain a single [impedance] bond at substations for the purpose of return propulsion current," reported C. M. Hursh, manager of traffic system applications.

A major implication of such a track circuit control is that it can substantially reduce the costs of signaling when a railroad electrifies. Present direct current track circuits cannot be used in electrified territory, hence the application of PMC track circuits may well be the answer. ■

LETTERS

Advertise what?

Grand Rapids, Mich.

To the Editor:

If the Association of American Railroads' planned investment of $2.5 million in advertising during the remainder of 1968 is going to be spent on selling the public on how vital the railroads are to our country, then these funds will be well spent. If, on the other hand, this investment is going to be used to convince the public that the railroad industry should be out of the passenger business and concentrate solely on the freight business, then it is my feeling that this $2.5 million will be in most part wasted.

The American railroad industry must come to the realization that the American public has in the past and will continue to associate the railroads with passenger and commuter service, as well as freight service.

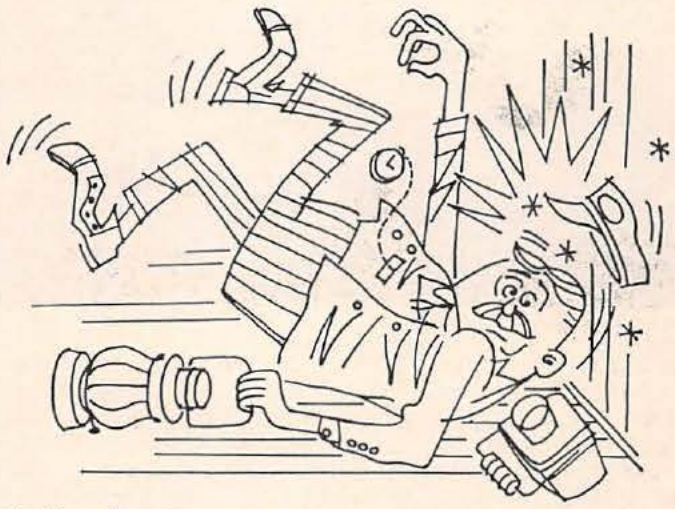
I have been in industrial traffic management for almost 17 years and certainly can support the idea that the railroads are vital to our economy and the nation in the freight segment of the railroad business. On the other hand, there have been numerous instances when I would have preferred to take a train on my many business trips but found there weren't any and instead was forced to, of necessity, fly or even in some cases take a Greyhound bus to reach a nearby destination.

While the railroad industry will not admit this, they have deliberately discouraged rail passengers almost without exception in every area of the country. Passenger stations have been allowed to deteriorate to a point of being an eyesore to the communities in which they are located. Equipment has been permitted to deteriorate to points where it is not suitable to haul cattle, let alone humans. The schedules usually are sandwiched in between freight schedules which take precedence in all cases. There are millions of people who would prefer to take trains if they were running and if a reasonable amount of convenience and comfort could be provided for by the railroads as they were many years ago.

Advertising is fine, and I think the railroad industry needs it desperately, but if you think it is going to counteract the actual actions and practices of the railroads then I say it would be better to buy about 165 new freight cars than to pay it out for commercials which are not going to convince the public of anything. The old adage "actions speak louder than words" has not changed.

P. T. Catalano, Manager
Traffic & Distribution
Steelcase, Inc.

Remember when severe slack-in or slack-out action used to be murder on conductors?



It isn't any more ... not since International came up with such features as overhead grab irons, nonskid floor coverings, recessed door handles, bevelled leading edges and other safeguards against being torn apart or knocked into next week. Crew safety features are of prime concern to International Car. So are many other factors contributing to efficiency and economy. We'd like to tell you about them all.

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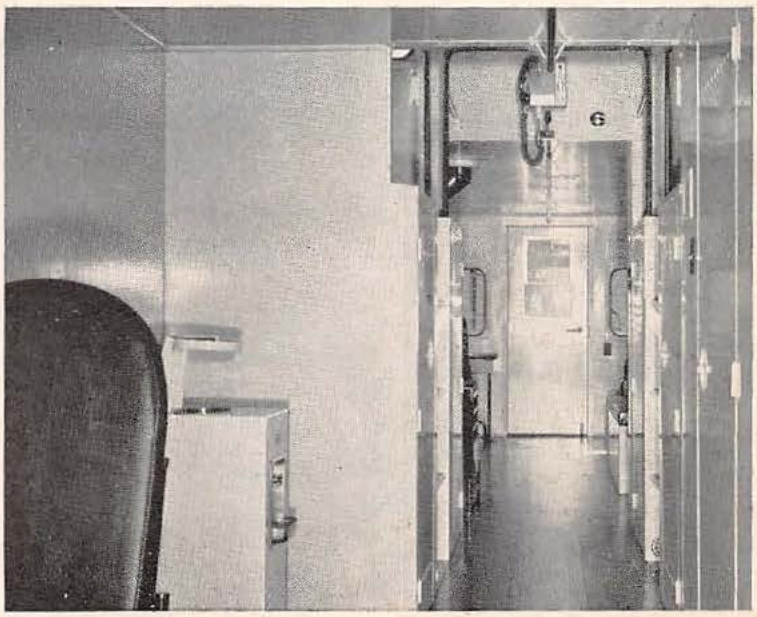

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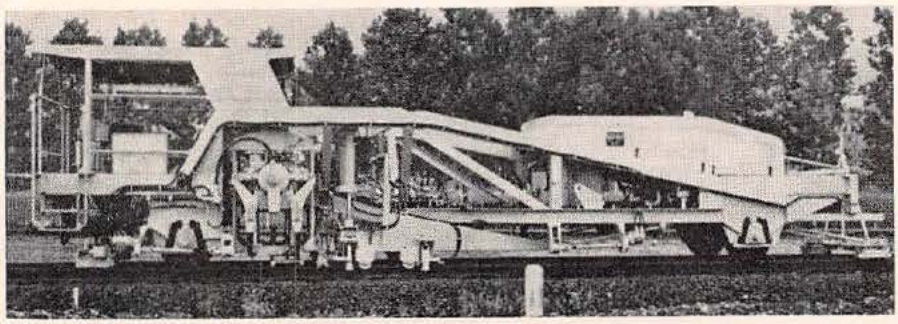
NEW PRODUCTS REPORT



Universal tamper (RA-1)

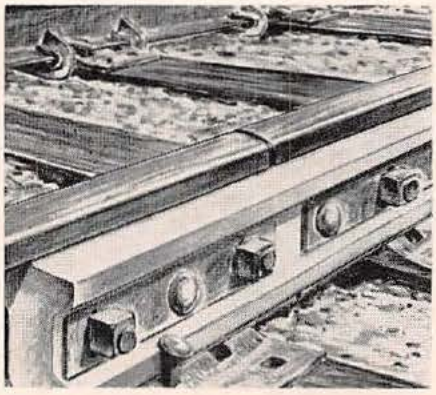
Designated the Plassermatic Universal tamper 06-16 SLC is a production machine that automatically lifts, levels, tamps and lines track. The tamping, lifting and lining components are mounted between the axles in front of the rear axle. Lifting is done by a unit above each rail that consists of a pair of clamps and two guide rollers. The leveling equipment consists of one front buggy carrying an infra-beam transmitter above the track center line, as well as a shadowboard and a receiver above each rail.

The lifting device can be combined with an automatic lining device whereby lifting, leveling and lining of track are done by means of hydraulic cylinders which are pivoted to the lifting clamps. The 06-16 tamper lines through curves and transitions without the need for previous computations.

It is powered by a diesel engine with a continuous output of 110 hp at 1800 rpm. It has a hydraulic drive via a five-speed gear box and cardan shaft to the drive axle. *Plasser American Corporation.*

Transport tractor (RA-2)

FWD, manufacturer of all-wheel-drive trucks, has entered the over-the-highway transport market with a 6x4 tractor, the ForWarD Mover. The tractor, Model B5-2178, is rated at 74,000 pounds GCW. Driving axles of the bogie have traction boosting differential tractionlocks which are said to give the operator a free differential design in which inter-axle and axle differentials are free-working in normal operation, and a maximum traction locking differential design in which driver-controlled tractionlocks, activated by a simple toggle switch on the instrument panel, lock out all differential action. There are pre-loaded, anti-friction roller bearings in the inclined kingpins of the 12,000-pound-capacity non-driving front axle to give easy steering. The wheelbase is 138 inches, the cab-to-rear-axle dimension is 72 inches. There is behind-the-core mounting of radiator shutters for engine temperature control. *FWD Corp.*



Insulated joint (RA-3)

A new insulated joint, designated the Portec Poly-Insulated Ra l Joint, features a new polymer insulated bar with a completely encapsulated heat-treated steel core. The manufacturer claims that advantages include a lower over-all cost, lower maintenance, improved safety factor, greater electrical effectiveness and dependability. Other features are a new filament-wound, replaceable steel bushing and a new water-repellent end post. *Portec, Inc.*

Speed reader (RA-4)

The first optical scanner on the market capable of reading hand-printed numbers offers a wide range of alternatives for capturing and entering source data directly into a computer. The scanner accepts documents ranging in size from 2¼ in. by 3 in. to 5.9 in. by 9 in. and conventional papertape rolls from 1.31 to 4.5 in. wide. It reads numbers and "C," "S," "T," "X" and "Z" which are hand-printed with a No. 2 lead pencil. *IBM.*

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THE TRANSPORTATION WEEKLY

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PLEASE SEND INFORMATION ABOUT PRODUCTS DESCRIBED ON PAGE 34 MARKED: RA-1 RA-2 RA-3 RA-4

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... STATE ..... ZIP

• Inquiries can be processed only if title and company are shown. 10/14/68

Can computers do a better job for the railroads?

It's the job of the hardware/software expert to harness the power of the computer. But it's the job of corporate management — top corporate management — to get involved early, to define the goals, to ride herd on data systems development and at the same time to give active support to the work of systems people.

The theme was one that ran strongly through the 1968 meeting of the AAR Data Systems Division—with six railroad presidents and the president of the AAR setting the pace.

• **Support from the top.** Keynote speaker W. Thomas Rice, Seaboard Coast Line president, put it this way: "An excellent way for us in management to keep abreast of changes in management technology is to become personally involved in systems development. This does not mean that each of us should become an expert in programming or mathematics, but it does require an understanding of how a computer system can fit into the scheme of our responsibilities.

"It requires us to believe that such a system can assist us in doing a better and more productive job. Unless this belief is prevalent on the part of management, no system will serve its potential and the productivity and financial improvements will not become self-evident."

Support from the top can mean that the over-all systems approach—looking at problems from the corporate standpoint not from an insular departmental viewpoint — brings about the necessary coordination and cooperation for profitable data-systems operation.

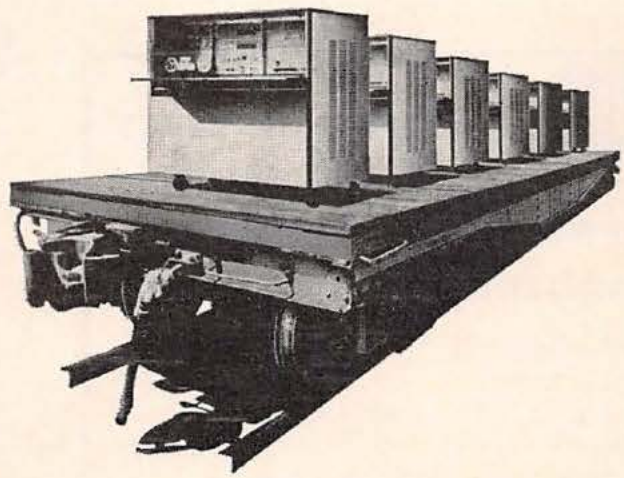
Rice said that "the computer's tremendous latent potential as a tool to aid railroad management in maximizing the profits of our companies will never be, unless we have incorporated into our management-information systems all of the accounting, operational and statistical data required to implement a truly real-time cost budgetary control system. Such a system must be designed to measure performance in terms of both units and dollars. Match this against realistic predetermined standards of performance and budgeted goals and report to various levels of management who are responsible for this part of railroad performance."

• **Key is profitability.** Although there have been significant advances in data processing, today's systems are out of step with today's problems because they do not enable roads to control profitability. The reason, according to Larry S. Provo, president, Chicago & North Western, is that the present data or management-information systems are not subjected to the accounting discipline. This is especially important when capital expenditures are made.

Provo said audit routines should be an integral part of systems development. Once money has been appropriated for a project, and the project completed, there should be an audit or study of the performance to determine if the project has been profitable and if its operating or financial goals have been met.

Illinois Central President William B. Johnson pointed to the need for cost-profit studies of traffic decisions. He

Production SEARCH* is 2 years old ...SEARCH Testing is 5 years old!



SEARCH production hardware was preceded by 3 years of prototype field testing—but it was worth it...

...just ask the SEARCH-equipped railroads that *are* using SEARCH 'round the clock. They're realizing *savings*...savings through more complete maintenance management—plus much quicker and more thorough maintenance, and increased fleet effectiveness.

Railroaders call SEARCH a maintenance tool... a tool that automatically checks all electrical wiring and components in today's and tomorrow's locomotives and verifies that locomotive performance meets specifications.

How come your railroad isn't saving with SEARCH too? For more details and *Field Result Data Reports* contact our SEARCH Marketing Department.

**Trademark of Dalmo Victor, A Textron Division*

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Circle 14 on coupon page 34

cited IC's efforts now under way in developing a computer simulation study which would determine "cash left over" after railroad service is performed for a customer.

● **Competing-mode costs.** Johnson said the study would include cost factors from competing transportation modes. The IC study is designed to enable the road to simulate carload shipment costs on the computer. This would permit pricing to be determined on the basis of costs based upon the types of equipment used, distance hauled, and the various other factors pertinent to moving the specific traffic. Ultimately, IC expects to develop a general economic model which would eliminate many special studies now required for individual commodities and/or moves.

Looking ahead, Louis W. Menk, president, Northern Pacific, said that an area of profitability would be simulation of terminal controls. Present techniques are being used to improve terminal performances. But computer simulation can advance the efforts even further. Going beyond present-day terminal performance control techniques "would be a simulation program at the yard computer to optimize daily operations in the retarder yard based on yard resources, advance consist information transmitted from the central on-line/-real-time systems and preselected yard operation rules," Menk said.

● **Reduce L&D expenses.** Santa Fe is working on two computer programs designed to prevent loss-and-damage claims due to high-wide loads being hit by obstructions or close clearances. Twin programs known as CLOG and CLEAR will be used to determine the routing of high-wide loads over Santa Fe's system. Said ATSF President John S. Reed, "CLOG is the program whose sole function will be to create and to up-date obstruction files. Obstructions are side and overhead clearance restrictions and equipment on opposing tracks.

"The dependent CLEAR program will require introduction of data on load dimensions which may be of a load carried on one or more cars, as well as data on the routes from origin to destination grouped in as many as five selections in order of preference," Reed explained.

● **Computers and consolidation.** Another task for the computer grows out of merger. Preparing for actual merger can be costly unless proper plans are formulated so that the transition from many separate roads to one unified system is smooth and efficient. One large-scale systems approach using computer technology was applied by Burlington: "In working out plans for the Burlington Northern merger, we made a distinction between that to be done on the merger day and that to be done at different times following M-day," reported William J. Quinn, CB&Q president.

"Obviously, the merged company must, when the sun rises on M-day, be able to perform as one unit, especially so far as transportation functions and car-service information are concerned. It is also important that we concentrate and process data to meet the requirements of federal and state regulatory bodies," Quinn said.

● **CPM played a key role.** Critical path method was used "to establish controls for both the planning and execution progress of various activities involved in the merger. Had our merger become effective last May 10, as expected, we would have been able to follow through with CPM as a means of monitoring post-merger day activities," Quinn said.

This merger CPM effort involved these steps:

—All work required to complete the merger was listed in detail.

—Time estimates were developed for each.

—Relationship of precedence was determined.

—Major goals and deadlines had to be identified. ■

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MARKET OUTLOOK

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Total Eastern and Southern Districts	324,689	350,113	363,192
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Central Western	118,707	108,559	120,890
Southwestern	42,065	40,662	41,362
Total Western Districts	243,708	232,506	257,839
Total All Roads	568,397	582,619	621,031
Commodities:			
Grain and Grain Products	49,270	50,876	55,259
Livestock	2,642	3,114	3,956
Coal	81,623	108,825	119,990
Coke	5,982	6,809	7,675
Forest Products	45,135	40,628	38,935
Ore	43,295	42,871	51,598
Merchandise l.c.l.	4,509	4,955	6,612
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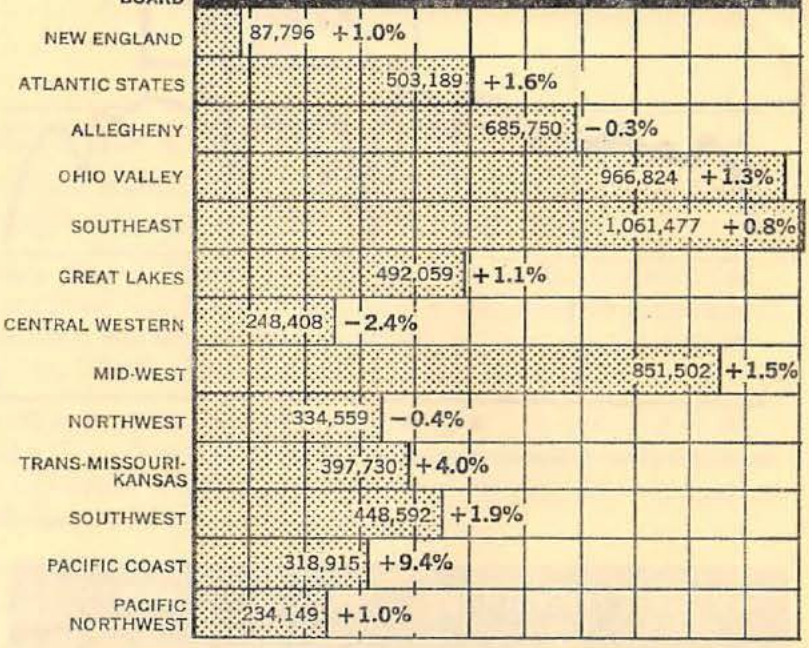
ESTIMATED CARLOADINGS

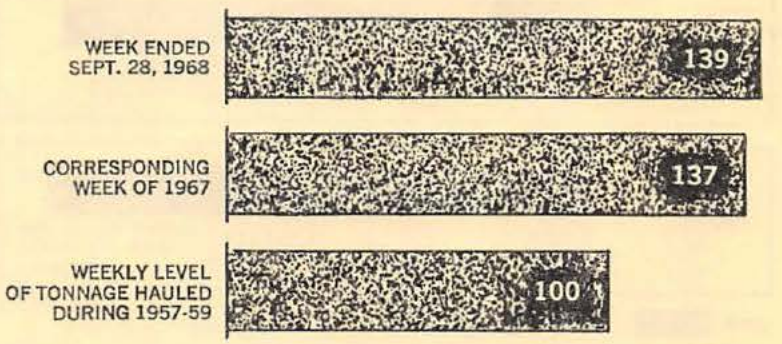
FOURTH QUARTER 1968

Showing percentage change from actual loadings, fourth quarter 1967



Source: Reports by 13 Regional Shippers Advisory Boards to Car Service Division, AAR.

INDEX OF INTERCITY TRUCK TONNAGE



Source: American Trucking Associations.

SELECTED OPERATING AVERAGES

(Class I line-haul railroads)

	1967	1966	1965	1964
Revenue ton-miles (billions)	719.4	738.3	697.7	659.3
Revenue passenger-miles (billions)	15.2	17.1	17.4	18.2
Car-miles per freight-car day	49.1	50.6	49.0	47.2
Per cent loaded of freight car-miles	58.9	60.3	61.0	60.6

Source: Bureau of Economics, ICC.

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English firm wins contract to supply LIRR equipment

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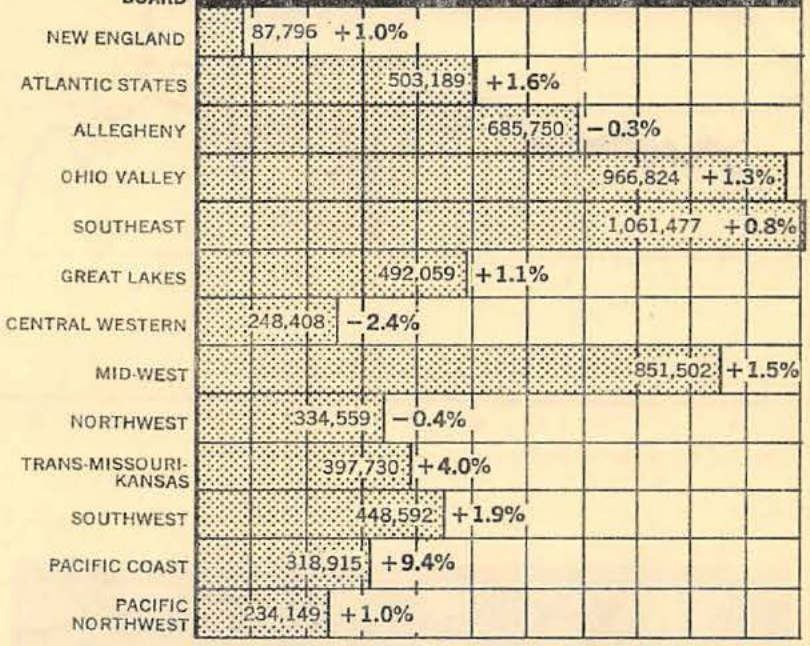
Showing percentage change from actual loadings, fourth quarter 1967



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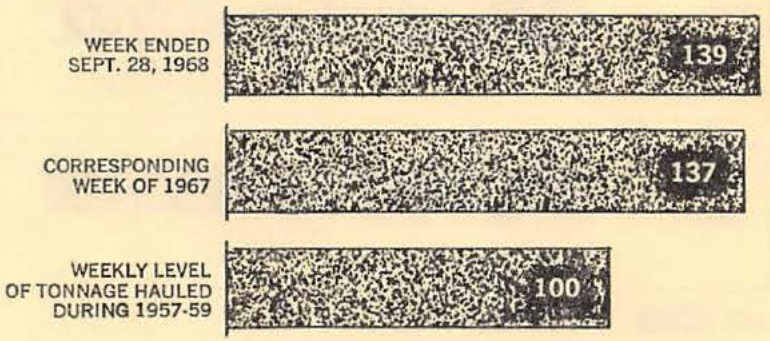
INDEX OF INTERCITY TRUCK TONNAGE



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Per cent loaded of freight car-miles	58.9	60.3	61.0	60.6

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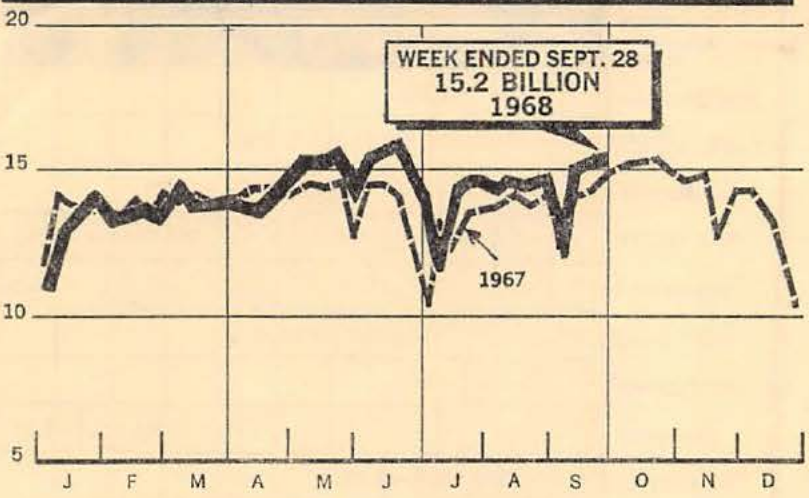
RAIL FREIGHT TRAFFIC TRENDS

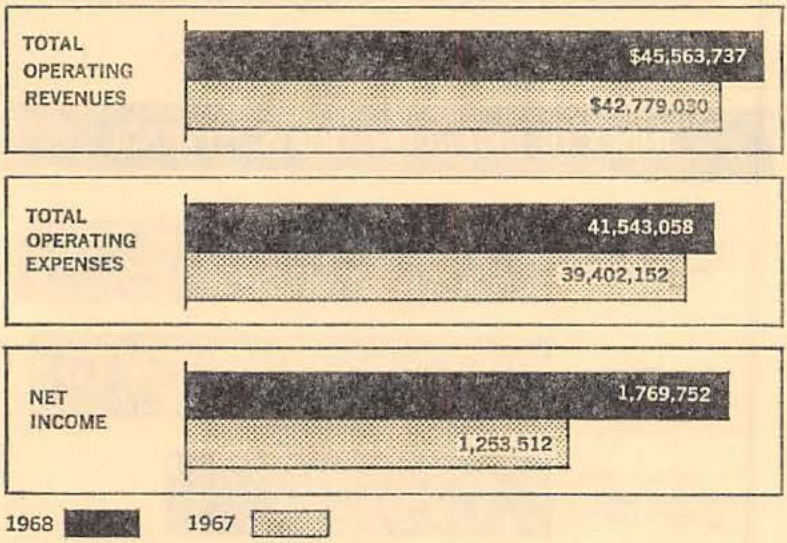
BILLION TON-MILES (Estimated)



Source: Association of American Railroads

FREIGHT FORWARDERS—SELECTED STATISTICS

(THREE MONTHS ENDED MARCH)



Source: Bureau of Accounts, ICC. Compiled from 62 quarterly reports of forwarders with annual gross revenues of $100,000 or more.

Current Statistics

Net income, Class I roads	
Six months, 1968	$284,000,000
Six months, 1967	$265,000,000
New freight cars on order	
Sept. 1, 1968	16,256
Sept. 1, 1967	26,122
New freight cars delivered	
8 months, 1968	38,614
8 months, 1967	60,189
Serviceable cars	
Sept. 1, 1968	1,388,680
Sept. 1, 1967	1,413,272

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FREIGHT TRAIN CARS

• *Boston & Maine.*—Will lease 184 50-ft, 70-ton box cars from U.S. Railway Equipment on a 10-year lease basis.

• *Green Bay & Western.*—Will lease 50 50-ft reconstructed box cars from U.S. Railway Equipment, with delivery scheduled for October. Earlier, GB&W arranged for lease of 150 similar cars from USRE (RA, Aug. 26, p. 65).

• *Norfolk & Western.*—Will rebuild 6,471 hopper cars at its Roanoke, Va., shops at a cost of nearly $4.4 million. The program will begin late this year. Cars now rated at 85-ton capacity will be modified to carry 100 tons.

• *Southern.*—Will lease 180 50-ton open-top hopper cars from U.S. Railway Equipment on a short-term lease basis.

• *Car orders and deliveries.*—Orders were placed in August for 3,156 new freight cars, compared with 2,792 in the preceding month, and 6,322 in August 1967. Rebuilds ordered in August totaled 600, compared with 1,523 in July, and 160 in August 1967. New cars delivered in August totaled 3,760, compared with 3,499 in July, and 6,916 in August 1967.

FREIGHT TRAIN CARS DELIVERED AND ORDERED IN AUGUST AND BACKLOG OF ORDERS ON SEPT. 1— ALL RAILROADS AND PRIVATE CAR LINES

	Aug. 1968	July 1968	Aug. 1967
Delivered			
Built new by car builders	2,488	2,476	5,779
Built new in R.R. shops	1,272	1,023	1,137
Built new—total	3,760	3,499	6,916
Rebuilt	964	1,026	1,778
TOTAL DELIVERED	4,724	4,525	8,694
Ordered			
To be built new by car builders	3,033	2,589	2,313
To be built new in R.R. shops	123	203	4,009
To be built new—total	3,156	2,792	6,322
To be rebuilt	600	1,523	160
TOTAL ORDERED	3,756	4,315	6,482
On Order and Undelivered	Sept. 1, 1968	Aug. 1, 1968	Sept. 1, 1697
Built new in R.R. shops	11,434	10,972	16,687
To be built new by car builders	4,822	5,971	9,435
To be built new—total	16,256	16,943	26,122
To be rebuilt	6,240	6,604	11,279
TOTAL ON ORDER	22,496	23,547	37,401

PIGGYBACK

• *REALCO.*—Ordered 251 trailers for assignment to its national railroad trailer pool. Orders, including dry vans, flat-bed trailers and high-cube drop-frame units, were placed with Dorsey, Timpte, Kentucky Manufacturing, Theurer, Arco and Great Dane.

• *Trailer Train.*—Placed orders for an additional 487 cars as follows: Bethlehem, 200 89ft, 4-in. standard level cars; Pullman-Standard, 40 89ft, 4-in. all purpose cars; 60 89ft, 4-in. container cars; and 187 60-ft flat cars. This brings TTX orders since Jan. 1 to 5,052 cars. On Oct. 2, Trailer Train had 48,130 cars in service or on order.

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R. A. Strickland
Am. Export Ind.

Charles H. Pergrem
C&O-B&O

John K. Cutforth
GN

S. E. G. Hillman
IC

Spencer D. Moseley
REA Express

Joseph T. Kane
REA Express

PEOPLE IN THE NEWS

AMERICAN EXPORT INDUSTRIES.—Richard A. Strickland, director of public relations and advertising, REA Express, New York, appointed to the newly created post of director of communications, American Export Industries, New York (RA, Sept. 23, p. 114). In addition to AEI's corporate and financial communications, Mr. Strickland will be responsible for management and coordination of public relations, advertising and promotion for the various divisions and subsidiaries in domestic and international intermodal transportation and containerization, computer and other equipment leasing and related fields.

ASSOCIATION OF WESTERN RAILWAYS.—James W. Nisbet, general solicitor, appointed general counsel, succeeding the late **Joseph H. Hays** (RA, July 1/8, p. 44). **Ed White** succeeds Mr. Nisbet. **Joseph D. Feeney** named commerce counsel. **John A. Billington** becomes general attorney.

BALTIMORE & OHIO.—Kenneth E. Mills, sales representative, Cleveland, appointed division sales manager, merchandise freight sales, Decatur, Ill., succeeding **W. H. Spink,** retired. **Robert C. Depp,** sales representative, Pittsburgh, transferred to Rochester, N.Y., succeeding **Otto C. Dlesk, Jr.,** who replaced Mr. Mills at Cleveland. **James A. Smith,** assistant storekeeper, Baltimore, appointed sales representative, merchandise freight sales department, Philadelphia, succeeding **H. F. Bower,** retired. **Carl R. Clawges,** who has been serving in an administrative capacity in the freight sales department at Buffalo, appointed sales representative there. **Kenneth E. Oboikovitz,** equipment supervisor, appointed customer service manager, merchandise freight sales department with headquarters as before at Chicago. **Herbert Sharp,** assistant signal supervisor, Chicago, promoted to supervisor signals, St. George, S.I., N.Y.

CHESAPEAKE & OHIO—BALTIMORE & OHIO.—Charles H. Pergrem, sales and service assistant, Baltimore, appointed manager passenger services, succeeding **John A. Black,** retired. **Lawrence J. Sebald,** supervisor passenger transportation and service, succeeds Mr. Pergrem.

(*Continued on page 42*)

DULUTH, WINNIPEG & PACIFIC.—T. E. Fearnall appointed comptroller–treasurer, Duluth, Minn., succeeding **R. F. Kennedy,** retired after 45 years of service.

FLORIDA EAST COAST.—D. K. Brideson appointed regional manager–sales and service, Chicago. **D. E. Marlow** named regional marketing representative–national accounts, Hialeah, Fla.

GREAT NORTHERN.—John K. Cutforth, director of special projects, named to the newly created position of director of sales. Mr. Cutforth replaces **Gerald D. Johnson,** general sales manager, who retired Sept. 30.

ILLINOIS CENTRAL.—Stanley E. G. Hillman named to the newly created position of vice president corporate planning and development for the railroad and **Illinois Central Industries.** He was formerly vice president and a director, **General American Transportation Corp.** (RA, Sept. 30, p. 62).

KANSAS CITY SOUTHERN.—G. M. Curtis appointed chief engineer, Kansas City, Mo., to succeed **C. G. Davis,** who retired Sept. 30 after more than 50 years' service.

NATIONAL RAILWAY LABOR CONFERENCE.—David P. Lee appointed general attorney and **Walter L. O'Neal** named attorney, Washington, D.C.

PENN CENTRAL.—A. Mosby Harris (general manager–transportation, Pennsylvania) and **Richard B. Hasselman** (assistant vice president transportation, New York Central) named assistant vice presidents–transportation.

James M. Loconto heads up the passenger department as assistant vice president–passenger service, with **William R. Main** appointed assistant vice president–passenger service economics, and **George M. Casady** named assistant vice president–passenger terminal services. All are former NYC officers.

John B. Dorrance, Jr., continues as director–Corridor Demonstration Project, a position he held for the PRR as coordinator of the New York-Philadelphia-Washington high-speed program.

Other appointments, concerned primarily with freight operations: **David S. Greer,** stations; **Charles R. Lucas,** freight car distribution; **Robert C. Marquis,** freight car utilization; **Charles R. McKenna,** locomotive control; **John W. Rathvon,** operating rules; **L. James Bossler,** freight train operations–Southern area; **Harold J. Slavin,** freight train operations–Northern area; **John Hobb,** unit train operations.

Directors of PC's passenger operations are **Arthur J. Dubs,** train operations; **David T. Hart,** passenger service; and **Sydney N. Phelps,** dining, sleeping and parlor car service.

Headquarters of the restructured Valley Division have been transferred from Cleveland to Youngstown to become part of the Pittsburgh-based Central Region. Moving to Youngstown: **William L. Holler,** superintendent; **T. L. Ray,** assistant superintendent, **Robert A. Schafer,** division supervisor of stations and **P. M. Campbell,** captain of police.

REA EXPRESS.—Spencer D. Moseley elected president and chief executive officer, effective Dec. 16, succeeding **Ray H. Jordan,** who will continue as a voting trustee and become chairman, executive committee. Mr. Moseley, who resigned the presidency of Mangood Corp., Chicago, to accept the REA position, has spent most of his career with General American Transportation Corp., where he was president (1961-1967). Mr. Jordan became president and chief executive officer of REA last July 1.

Joseph T. Kane, assistant director of public relations and advertising, New York, promoted to director of public relations and advertising, succeeding **Richard A. Strickland,** who has joined American Export Industries.

SOUTHERN.—William C. Bennett, Jr., general tax attorney, Southern, Washington, D.C., has joined **Atlantic Richfield Co.** as associate general counsel–corporate tax manager, New York.

SOUTHERN PACIFIC.—Ernest E. Portwood, assistant general traffic manager for SP's Texas and Louisiana lines, Houston, appointed general traffic manager there, succeeding **George E. Miller,** retired. Mr. Portwood's successor is **Frank T. Kearns,** assistant general freight and passenger agent, Los Angeles.

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VIEWPOINT

What a growth industry needs

By new math or old math, by adding machine or abacus, certain figures keep turning up in the economics of management-labor relations in the railroad industry. Their implication cannot be ignored —if either management or labor wants to survive and prosper.

First, consider dollars. The annual cost of a 1% wage increase applied to all union employees is more than $47 million. The 1968 pattern wage settlement, including general increases and inequity adjustments, works out to 7.5% for this year plus 5% in 1969.

Second, consider labor's claim on the revenue dollar. Before World War II, the ratio of employee compensation to total revenue was 48.4%. By 1966, this had climbed to 52.3%. During the same period, the ratio in the rest of the transportation industry dropped from 51.4% to 46.4%.

Third, consider the squeeze. For good or for bad, the annual wage increase has come to be a part of the American way of life. But, the fund out of which those increases are paid shows no corresponding annual jump. Marketing men might argue with the industry's chief labor negotiator, who sees "every indication that this situation [of relatively constant revenues] will prevail in the future." Leaving aside the forecasts, however, there is this fact: For close to 20 years, total revenue has indeed fluctuated within a quite narrow range.

Finally, consider the alternatives. There is the application of new technology to boost productivity. For various reasons, some of them legitimate, this is an evolutionary process. There is the possibility of breaking-even in the cost/revenue vise by cutting employment every time labor costs go up. But this area offers less and less room for maneuvering. There are the far-out proposals, and the naive ones. Nationalization gets an occasional longing mention—though not from anyone who has observed the workings of that other great nationalized industry, the U.S. postal system. The conglomerate surge might also be cited by some, on the grounds that strong elements will shore up the weak. But that reasoning would have to involve repeal of the principle that each division of the whole must stand on its own.

COOPERATION IS A MUST

In the end, the search for a workable solution almost inevitably leads to one conclusion: The industry's managers and the industry's employee representatives do have it in their power to create growth—if they can bring themselves, in time, to use that power together and in the right ways.

Some would call it heresy, to invite the assistance or the involvement of labor. For sure, it would require radical changes in thinking, on both sides. But there are those in the industry to whom this kind of joint venture seems logical—and, more than logical, necessary. There is, in it all, an appeal to reason—and the hope that management and labor can do together what neither can do as well separately: Re-create a growth industry.

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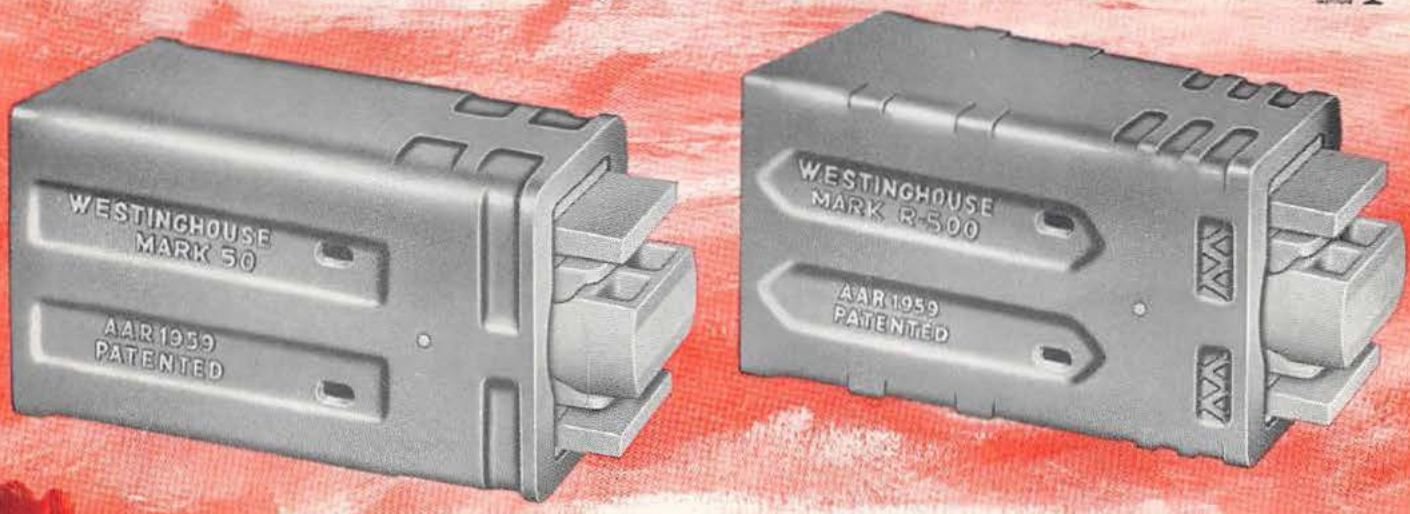

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